

# PUBLIC WORKS

**Feb.**  
**1951**

**CITY, COUNTY AND STATE**

**Better Ways of Using  
Motor Trucks**

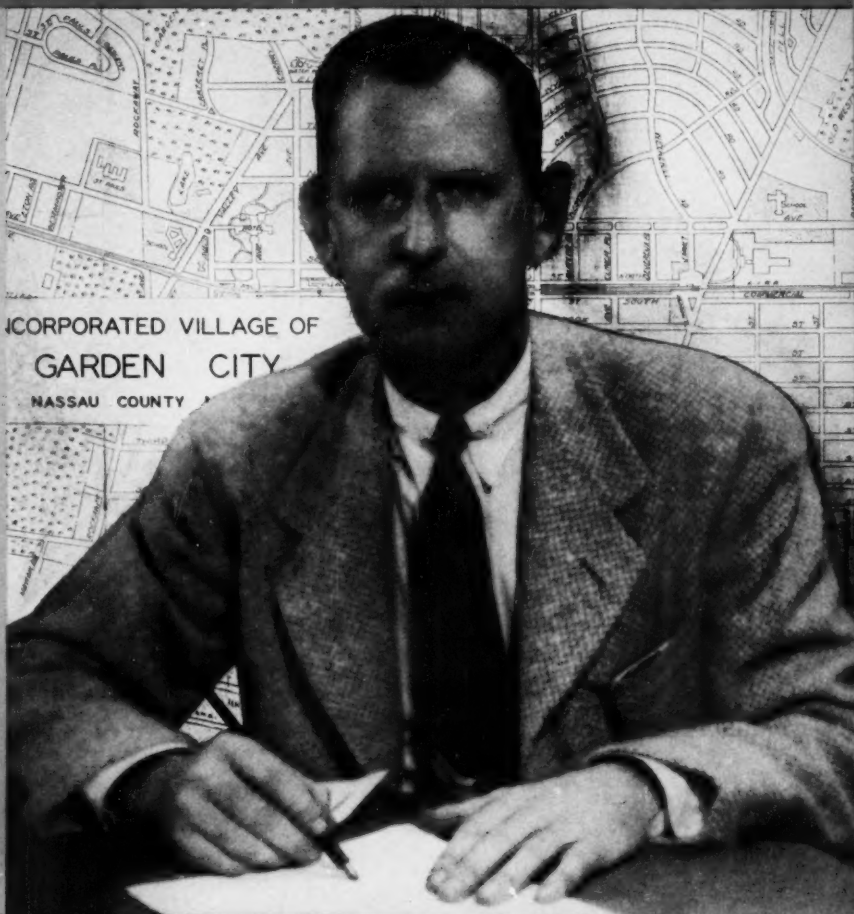
**Cement Lining Cast Iron  
and Steel Fittings**

**Solving the Sewer  
Cleaning Problem**

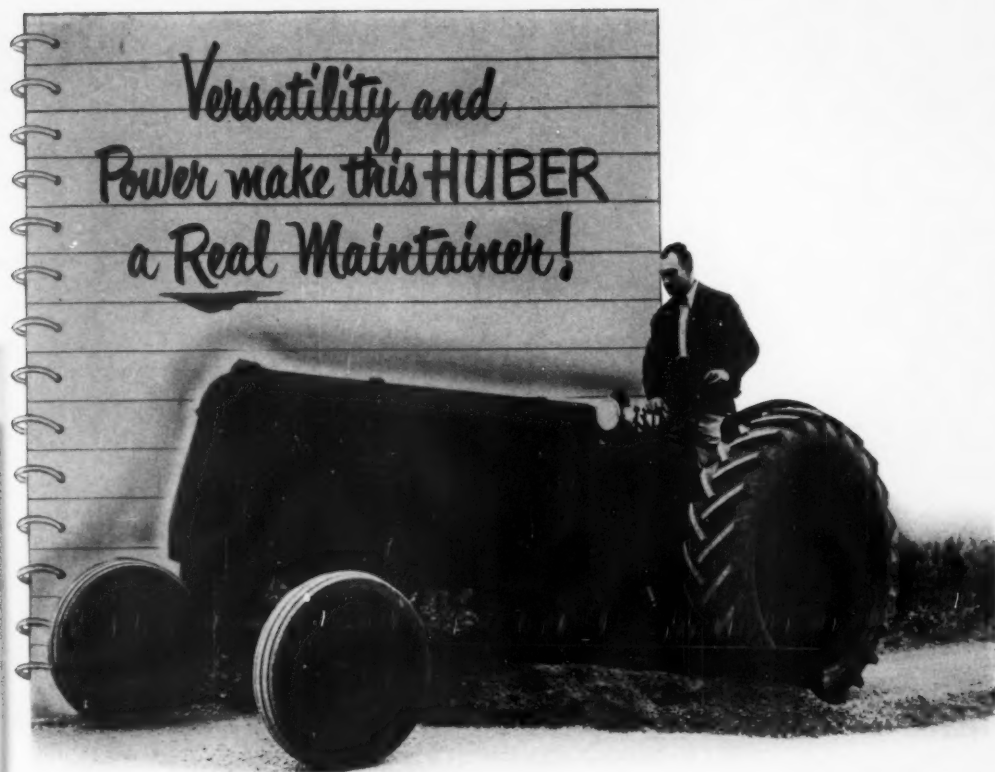
**Numerical Ratings for  
Streets and Highways**

**How Engineers May Apply  
for Commissions**

**Seasonal Conditioning for  
Your Swimming Pool**



**Leaders in the Public Works Field: Allen H. Rogers, Superintendent of Public Works of Garden City, Long Island. More data on page 31.**



**Look at its versatility!** Hydraulically controlled attachments quickly and easily convert it to bulldozer, lift loader, highway mower, berm grader, broom, road planer, patch roller or snow plow service.

**Look at its power!** . . . 42½ H. P.

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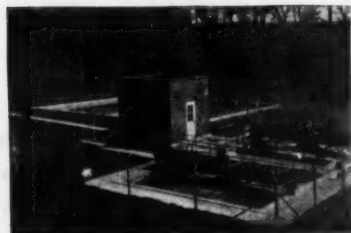
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• FOR INDUSTRIAL PLANTS  
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• FOR INSTITUTIONS  
*Soldiers' & Sailors' Orphans' Home  
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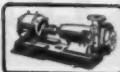
Specify Chicago "Package" Plants, proved by 16 years of successful performance.

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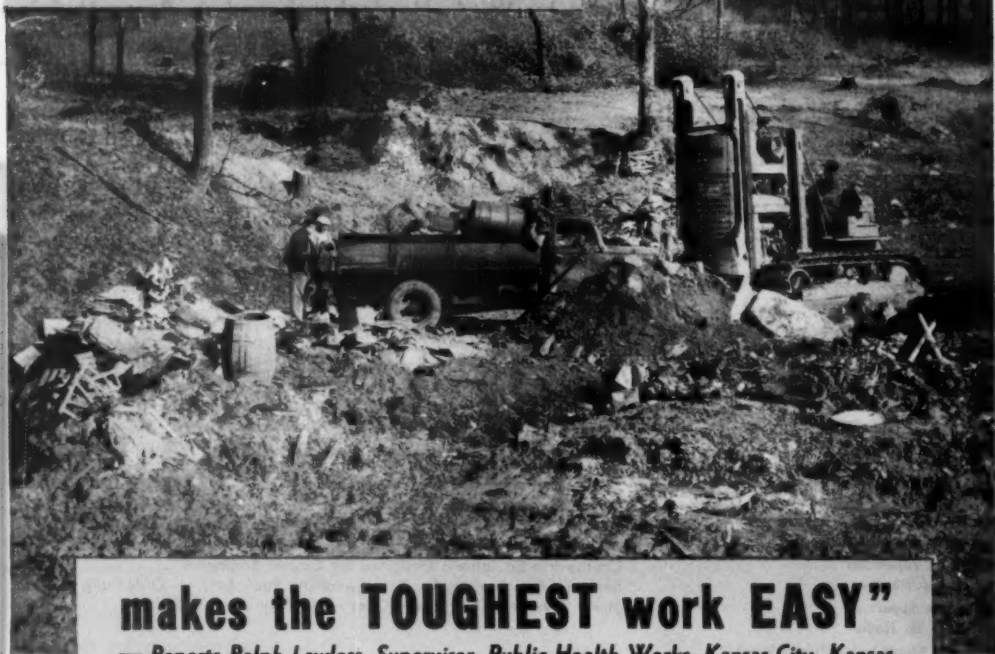
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THE ENGINEERING AUTHORITY  
IN THE CITY-COUNTY FIELD

# "Our T7 TRAXCAVATOR



**makes the TOUGHEST work EASY"**

— Reports Ralph Lawless, Supervisor, Public Health Works, Kansas City, Kansas

Work at the Kansas City Sanitary Landfill required a machine that could excavate, carry, bulldoze, load, spread, compact, grade, and remove trees . . . TRAXCAVATORS had all these qualifications and more, too . . . a T7 TRAXCAVATOR got the job!

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removal, loading, excavating, sewer work or any of the many other tasks that TRAXCAVATORS can do well. Join Kansas City and hosts of other cities and towns, large and small, owning and using versatile TRAXCAVATORS the year round, saving time and money on their varied operations.

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# THE EDITOR'S PAGE



## These Young Engineers Must be Conserved

Most of the engineers who have graduated from our engineering colleges since the war ended in 1945 are now in the draft age. It is an almost absolute certainty that those not in ROTC or already in the reserve are going to be drafted. This country cannot afford to lose these engineering skills. If these men are taken, there are only the engineers that were available in 1941, and they are all ten years older.

We have contacted the Corps of Engineers, the Navy, the Public Health Service, the Air Force and the Army Medical Department and have been assured by all of them that channels are available whereby these men can be commissioned or can be tagged so that later they can be salvaged. Our own experience has been that it takes a large and flaming tag to locate a man after he has disappeared into the enlisted ranks, therefore immediate commissioning is best.

All of the above organizations have promised to send us detailed data on how these young engineers can proceed. It is expected to arrive in time for inclusion in this issue. It will be published at the earliest possible moment after we receive it. We feel a deep obligation to these young engineers to see that they have every opportunity to serve in the fields in which they are most valuable; and anything we can do to assist in this will be a pleasure. However, where detailed information is given, we hope that the directions will be followed fully before assistance from this office is requested.

## Some Public Works Are As Essential as Munitions

With the experiences of World War II far enough behind us so that we can study some of their lessons objectively, it is amazing to note certain careless and thoughtless comments on cutting down public works construction. It is no doubt true that there are some forms of public improvement work that can be reduced, but there are other public works that are just as essential to this nation as are munitions. We believe that this is fully realized by most people in responsible charge though it is not always made clear. Let us look at the story briefly.

As to highways, no one of ability and of experience in our war-time mobilization problems can believe that our present highway system is sufficient for our emergency or war-time needs. It must be expanded for it will not even carry our present peace-time flow of traffic. So far as maintenance goes, such work is essential, as every highway engineer and administrator knows.

During the recent war the Army, Navy and Air Force spent hundreds of millions of dollars in constructing water works systems for posts, camps, fields and plants. Most, or much, of this could have been saved if our cities had been able to supply the water needed for these installations. However, municipal plants were not large enough, so critical supplies, labor and equipment had to be diverted to build special plants which, after four or five years of service, have mostly gone into the discard. Industries are especially dependent on ample water supplies, and without water there will be little industry and little munitions. Our civil population can be rationed on water; and our troops can drink from streams, as in the days of the Civil War; but we do not think that this country needs to do this or would stand for it for very long. There are deficiencies in water supply in many cities, especially if industry is to be served. The longer we wait to provide this water, the more it will cost and the harder it may be to get the materials.

In these days and times we must have airports, and airports today are huge structures which require time, materials and money to construct. It is but common sense to provide a reasonable number of them to meet our present needs, thereby lessening the construction load in time of emergency, when we are already stretched out thin.

As in the case of water supplies, the armed forces spent many, perhaps hundreds of, millions of dollars on sewage treatment installations. The situation in this field differs somewhat from that in water supply, in that even had municipal plant capacity been available, many additional sewage treatment plants would have been necessary to serve the military installations. Substantial sums, however, could have been saved if there had been more municipal plants large enough and modern enough to handle some of this military load.

(More on page 20)

# Fluoridation News

1945  1950

W&T ENGINEERS  
NEWBURGH, N. Y.

W&T ENGINEERS  
NEWBURGH, N. Y.

Fluoridation has come a long way since that day in 1945 when W&T Engineers, in conjunction with health authorities, made the now so well known fluoridation installation at Newburgh, N. Y. At that time, fluoridation was in the experimental stage—was looked upon as a possible, though still to be proven, method of reducing the incidence of dental caries.

Now, however, fluoridation, through intensive research and development and through practical application in many W&T installations, has merited the endorsement of such organizations as the American Water Works Association, the American Public Health Association, the American Dental Association, the Conference of State and Territorial Health Directors, and the Conference of State and Territorial Health Officers.

Accordingly, it is the announced policy of these and other similar organizations interested in the problem to approve the application of fluoride where such application is properly engineered, is under the guidance of qualified personnel and is recommended by the appropriate local professional groups.

Therefore, when *your* community is ready to look into fluoridation—and after you have consulted your State Department of Health—you'll find W&T Engineers ready and willing to help you. They can bring the following guidance to your problem.

1. Recognition of the fact that no two fluoridation problems are alike.
2. Facts and figures to help you decide which of the several ways of adding fluoride is most suitable for your needs.
3. The experience of over five years in the practical application of fluorides.
4. Data on what fluoridation can and cannot accomplish.
5. A full line of dry chemical and solution feeders tested and proved through years of operation and known to be suitable for fluoridation.
6. Over thirty-seven years' experience in the field of water treatment.

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because—

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- ✓ For Simplified Servicing

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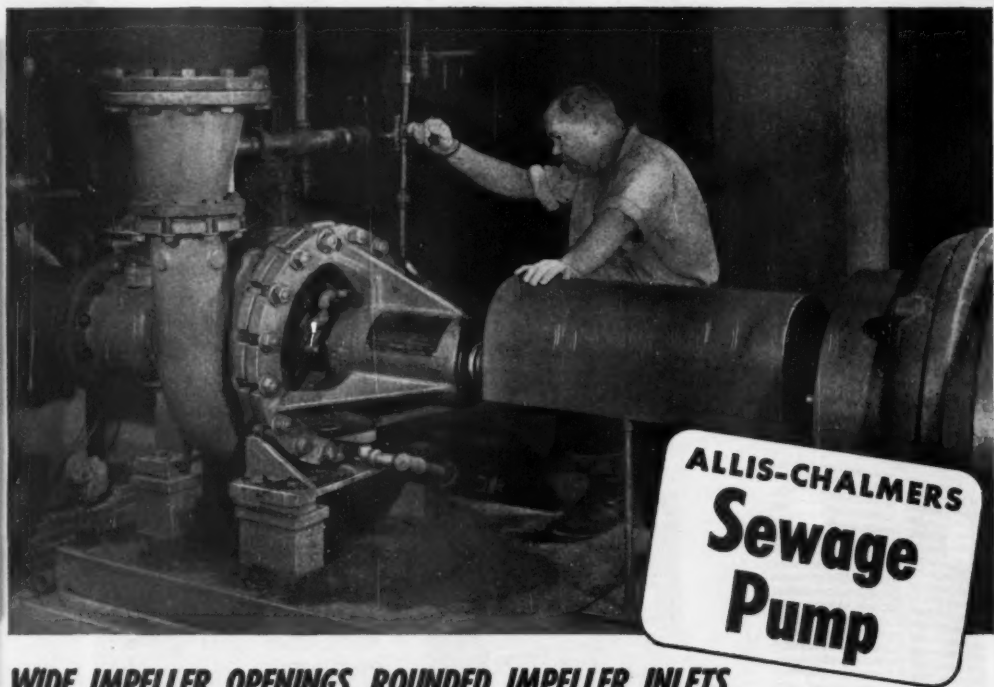
Complete Line of Matched Equipment,  
Developed in Cooperation With  
Allied Manufacturers, Available For Both The HD-9  
and HD-15.

# HD-15

WEIGHT: 27,500 lb.  
102 DRAWBAR Hp.  
GM 6-71 DIESEL ENGINE  
SPEEDS: 6 forward, to 5.80 mph  
3 reverse, to 4.51



# Non-Clog Design Keeps Sewage Flowing



**WIDE IMPELLER OPENINGS, ROUNDED IMPELLER INLETS  
PASS SOLIDS FREELY — KEEP PUMPING EFFICIENCY HIGH**

**W**HAT DO YOU look for in sewage pumps? A pump that can "take it"? Continuous high operating efficiency? Easy Maintenance? Read below how Allis-Chalmers new "SW" pump gives you all three — in standard sizes up to 10,000 gpm.

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Want all the facts? Get details from bulletin 08S7504. Call your A-C representative today, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

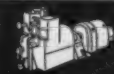
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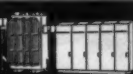
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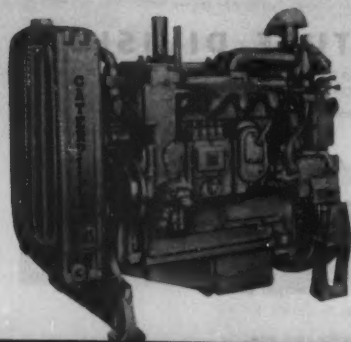
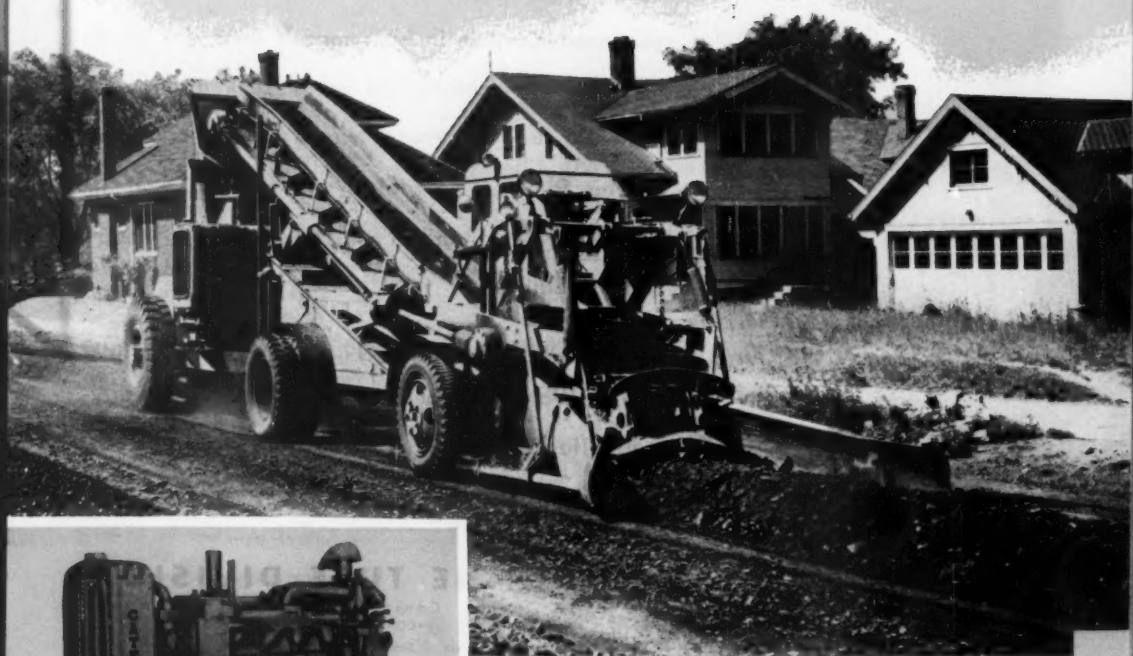
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**W**ORK engine for a work job—the D315 "Caterpillar" Diesel Engine powers the new Athey Portable Breaker. The breaker works with the Athey Forced Feed Loader. Old scarified-and-windrowed road surface material is picked up by the loader—then fed to the crusher and returned to the road. The crushed material is of uniform size and is a very compactable aggregate. The "Caterpillar"-powered Athey Portable Breaker offers governmental users an effective method of conserving materials—and of stretching the tax dollar.

"Caterpillar" Diesels cut their teeth on the tough, rugged jobs. They are designed to withstand the shocks and stress of construction duty. Their working parts are thoroughly sealed against the entrance of abrasive dust and grit.

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**PIERCE COUNTY, WASHINGTON**—this Athey Portable Breaker is "reconditioning" old surfacing material. The D315 powers the breaker.

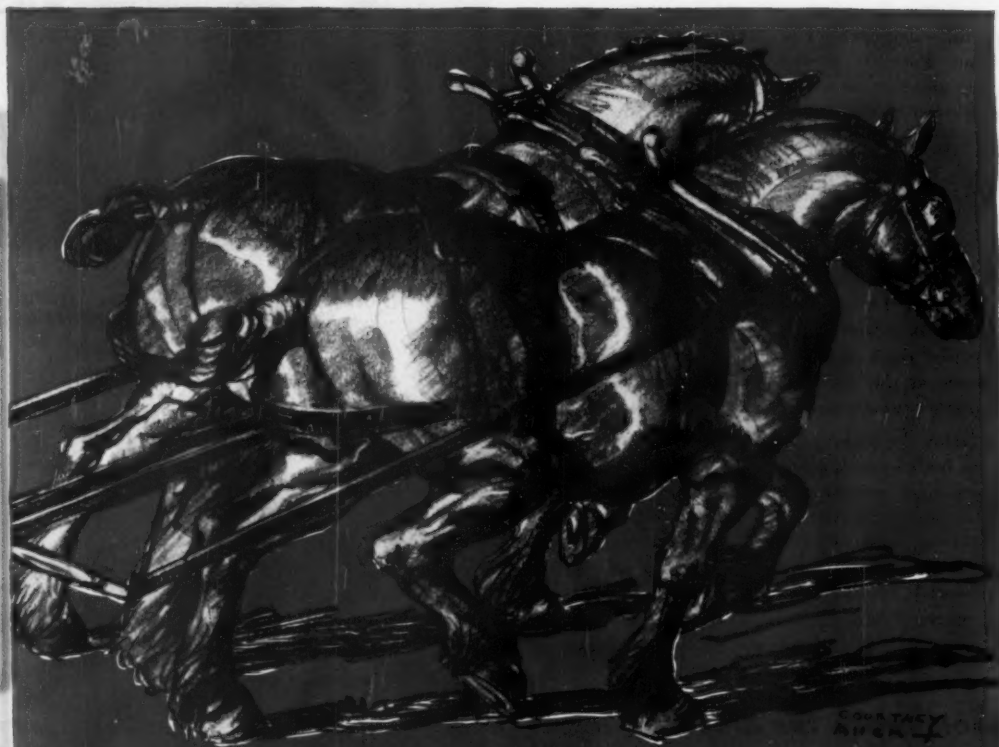


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**DIESEL ENGINES • TRACTORS • MOTOR GRADERS  
EARTHMOVING EQUIPMENT**

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**Like a Belgian draft horse  
cast iron pipe is known for strength**

Be doubly sure when you specify pipe for mains to be laid under city pavements. Sure that it effectively resists corrosion. Sure, also, that it has the four strength factors, listed opposite, that pipe must have to withstand beam stresses, external loads, traffic shocks and severe working pressures. *No pipe, deficient in any of these strength factors, should ever be laid in*

*paved streets of cities, towns or villages. Cast iron water and gas mains, laid over a century ago, are serving in the streets of more than 30 cities in North America. These attested service records prove that cast iron pipe not only assures you of effective resistance to corrosion but all of the vital strength factors of long life and economy.*

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# in pipe for city streets

*No pipe that is deficient in any of the following strength factors should ever be laid under paved streets.*

## CRUSHING STRENGTH

The ability of cast iron pipe to withstand external loads imposed by heavy fill and unusual traffic loads is proved by the Ring Compression Test. Standard 6-inch cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

## BEAM STRENGTH

When cast iron pipe is subjected to beam stress caused by soil settlement, or disturbance of soil by other utilities, or resting on an obstruction, tests prove that standard 6-inch cast iron pipe in 10-foot span sustains a load of 15,000 lbs.

## SHOCK STRENGTH

The toughness of cast iron pipe which enables it to withstand impact and traffic shocks, as well as the hazards in handling, is demonstrated by the Impact Test. While under hydrostatic pressure and the heavy blows from a 50 pound hammer, standard 6-inch cast iron pipe does not crack until the hammer is dropped 6 times on the same spot from progressively increased heights of 6 inches.

## BURSTING STRENGTH

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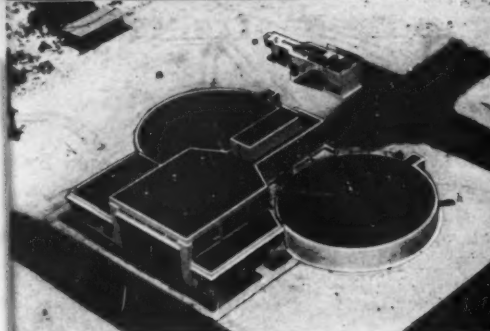
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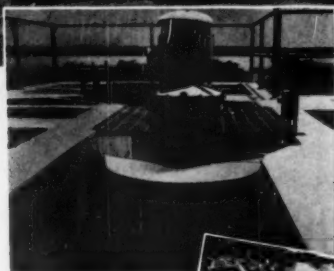


## FOR EVERY STEP OF YOUR SEWAGE TREATMENT PROCESS

**W**HEN you specify INFILCO Sewage Treatment Equipment, you get more than just equipment. Actually, you specify over 50 years experience in the design and manufacture of a complete range of water, sewage and waste treatment equipment.

You have *one source* to depend upon for experience in both chemical and biological treatment . . . for the major equipment items as well as the important control devices. And by providing a *complete range* of sewage treatment equipment INFILCO offers the all-important advantage of *undivided responsibility*!

A complete laboratory and staff of competent engineers are available for making recommendations and reports to the consulting engineer or his client. It is, of course, intended that this service shall cooperate with the work of your engineers. When considering your next sewage treatment plant, or the modernization of an existing one, call in your nearest INFILCO Field Engineer, or write our executive offices in Tucson.



### SEND FOR . .

Bulletin No. 60-C. It illustrates and describes many items of Infilco Equipment.



## INFILCO INC.

NEW YORK 17 • TUCSON • CHICAGO 16

SALES OFFICES IN TWENTY SIX PRINCIPAL CITIES

WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

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## Shaker Heights PROFITS on Many Jobs

Take up, load out old pavement

\*  
Grade for street widening,  
parks

\*  
Backfill trenches

\*  
Load catch basin debris

\*  
Load all leaves and street  
scrapings

\*  
Remove ice and snow  
from streets

\*  
Load sand, cinders, salt, dirt

\*  
Feed concrete mixer in yard

\*  
Feed paper baler, load bales  
on trucks

\*  
Lift and carry snowplows, other  
equipment in yard and on jobs

\*  
Dig, strip, grade, load trucks

How does a city use PAYLOADERS? The Service Department of the city of Shaker Heights, Ohio, provides a good answer because it uses them in so many ways. This department has the task of maintaining, cleaning and clearing of 100 miles of paved streets, maintenance and landscaping of boulevards and parks, collection and disposal of all city leaves and paper. Their three PAYLOADERS take an important part in all these operations.

This versatility of PAYLOADER tractor-shovels for all sorts of digging, grading, loading and lifting work plus their ability to go where they're needed at speeds up to 20 miles an hour, has made them favorites with city, county and state public work departments. If PAYLOADER usefulness is not yet working for you, see your PAYLOADER Distributor or write The Frank G. Hough Co., 761 Sunnyside Ave., Libertyville, Illinois.



### Job Study No. 19 —

This picture-and-word report on how the city of Shaker Heights uses its PAYLOADERS is available on request.



# PAYLOADER®

THE FRANK G. HOUGH COMPANY • • • SINCE 1920



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### 3 Great Helps for Readers of PUBLIC WORKS



#### It's easy to compare different makes of products when you use these Manuals

One or more of these handy Manuals is sent to every reader of PUBLIC WORKS Magazine each year. They describe every type of product that can be used for each purpose. They are unbiased and well illustrated. Names and addresses of all important makers are given. Leading manufacturers offer additional buying facts about their products in the advertising pages.

#### Keeps you from overlooking any product

When you have a problem these Manuals make it easy for you to find out what material or equipment will help you solve it. Just look in the chapter devoted to the subject. Everything is there. You don't have to know the names of the products or who makes them.

Use these Manuals regularly. Get them out and look them over now. See how easy they are to use. And remember . . . they are authoritative, dependable and complete.

Headquarters for  
Engineering Information

# PUBLIC WORKS



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## EDITORIALS

from page 7

In some cases, expensive water treatment plants had to be built to serve military installations because untreated, or slightly treated, sewage was being discharged into the watercourses from which it was necessary to draw water. Stream pollution sensibly reduces the available supplies of usable water and increases the cost of reclaiming that which must be used.

Public works of the right kind can be money in the bank for us in time of an emergency. If we have an adequate highway system, ample water supplies of good quality, needed airports to handle vital air traffic, and waste disposal systems that prevent disease and conserve water for fuller use, we do not have to provide these things at a time when every energy is being pushed to the limit to raise and train men and provide them with the materials they need.

#### More Valves for our Water Systems

Since valves in water distribution systems are used only occasionally, generally in emergencies for cutting out of service a section on which repairs are necessary, there is a tendency to install too few of them. The result is that, in case of a break, much valuable time may be lost and water wasted while a number of valves are being located and closed, with annoyance to consumers.

This might be a vital matter in case of disaster or attack, especially if fires are started, requiring the use of hydrants. It would be much better to follow the ideal plan of placing a valve on each main on each side of each intersection or junction of mains. If this were done, no single break in a main would necessitate closing more than two valves or cutting off service from more than a single block. An important feature of preparedness for disaster would be to start installing, at once, such valves, beginning with those locations where their absence might be especially calamitous.

#### Tularemia Carried by Water?

Contamination of mountain streams with *P. tularensis*, often persisting for months, has been repeatedly demonstrated at the Rocky Mountain Laboratory of the Public Health Service. Mostly, the presence of these organisms in the water has been associated with the occurrence of tularemia in beavers and muskrats. Recently four cases of tularemia occurred which were associated with one water supply and the circumstances appeared to preclude other sources of infection.

It was demonstrated in two consecutive tests that the water supply at the residence of one of the patients was contaminated. When a survey was made of users of this water, it was found that two previous residents had also experienced persistent and severe sore throats; both reacted positively to the titer for *P. tularensis*. Three others using the same water did not report any suggestive illness, but reacted positively to the titer. These data are from Public Health Reports.

# Presenting...

## the Hotpoint Municipal Plan of Food-Waste Disposal for City Officials!



Garbage collection and disposal have always presented an unsavory and expensive problem to municipal officials. The Hotpoint Municipal Plan provides a method of eliminating food-waste before it becomes garbage. Thus, garbage cans, garbage trucks and their operators, and a garbage collection budget are no longer needed.

A complete, factual presentation of the Hotpoint Municipal Plan, based on experience and written specifically for municipal officials, is available for your study. This plan is being presented at the request of municipal governing bodies all over the country. We shall be happy to present it to you.

### Your community will welcome the opportunity to enjoy:

- A convenient, new and modern food-waste removal system.
- Health protection to the members of all families.
- Fly and rat pest reduction.
- Garbage collection cost reduction.
- More digestion gas for use and sale.
- Elimination of food waste before it becomes garbage.
- Elimination of alley garbage can.
- Elimination of garbage collection problems.
- Elimination of garbage odors.
- True sanitation for your town.



The Hotpoint Disposal® food-waste disposer is easy to install in any sink... convenient... safe... odorless and economical. Simple to operate... keeps kitchens, sinks, hands clean. Does not overload or clog sewer systems. Can also be used with septic tank.

### HOTPOINT Disposal Dept.

5600 West Taylor St., Chicago 44, Illinois

We would like to have more information on the Hotpoint Municipal Plan of Food-waste Removal.

Name

Address

City  Zone  State

Title

And—it saves you money!

# Hotpoint Inc.

(A General Electric Affiliate)

Thousands use our Readers' Service card to keep up to date... do you?

# A Dresser-coupled steel line delivers water cheaper...

The cheapest way to deliver water to the place where it turns into revenue is with a Dresser-Coupled steel line—the line that:

- Cuts installation costs
- Cuts leakage losses
- Cuts maintenance costs

When you're fighting a water shortage, you want pipe and joints that go in fast, deliver *all* the water you pump. You want to lay up to 2,000 or more feet of pipe per day with each small crew, use a minimum of expensive heavy equipment and have the assurance of foolproof, *tight* joints. Steel pipe, Dresser-Coupled, gives you these advantages.

Add the benefits of modern, glass-smooth linings; tough, shatterproof, long-lived steel pipe, and flexible Dresser Couplings which *absorb* underground stresses—you have made an investment in permanence which will save you many thousands of maintenance dollars in the years to come.

Ask your Dresser Sales Engineer or write today for literature.

**BE SURE** you get the best line at the best price. Put steel pipe and Dresser Couplings in your specifications.



Near SAN DIEGO, Cal., this 16", six-mile branch of the San Diego Aqueduct was laid fast to help relieve a drought-caused water shortage.

## DRESSER "FLEXIBLE-TIGHT" COUPLINGS

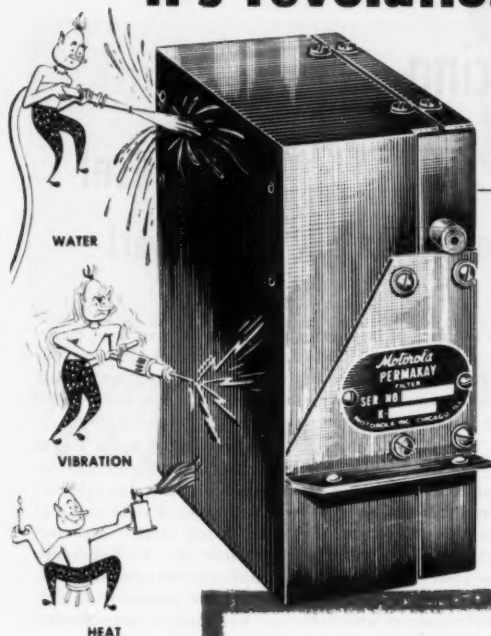
Dresser Manufacturing Division, 59 Fisher Avenue, Bradford, Pa. (One of the Dresser Industries). In Texas: 1121 Rothwell Street, Houston. In Canada: 629 Adelaide St., West, Toronto, Ontario. Sales Offices: New York, Chicago, Houston, Philadelphia, San Francisco.



Now's the time to mail this month's Readers' Service card.

# it's revolutionizing 2-way radio

# it's permanent!



## Motorola's amazing invention . . . THE SENSICON

PERMAKAY FILTER FOR GUARANTEED  
PERMANENT SELECTIVITY! *Thousands*  
*in the field, operating year in and*  
*year out, without failure.*



Permakay is here to stay  
as the keystone of the  
Sensicon Circuit

The Permakay I.F. Wave Filter for PERMANENT SELECTIVITY—*guaranteed for the life of the set!* This coil and capacitor filter network is noise-balanced for optimum signal-to-noise ratio, achieved by counterphasing. These super-precision elements are cast in solid waterproof plastic which will not melt, crack, loosen, or deteriorate. PERMAKAY thus assures *permanent* precision selectivity, reduces maintenance, and increases all-around serviceability of your Motorola equipment.

. . . HERE AGAIN THE **MOTOROLA GUARANTEE** provides perfect radio service today and protects against obsolescence tomorrow. When radio channels are split you need not buy a new receiver—simply exchange the standard-channel Permakay filter for a new split-channel filter and your receiver is up to date and ready for years of service.

## Motorola FIRSTS

TRUE ADJACENT CHANNEL  
SPLIT CHANNEL  
SENSICON CIRCUIT  
PERMAKAY\*

static oscillator  
iso q cavities  
differential squelch  
capacitance discriminator  
instantaneous deviation control  
bridge balanced crystal oven

SO INSIST ON SENSICON and protect your investment!

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Communications and Electronics Division  
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Rogers Majestic Electronics Ltd., Toronto, Ont.

SPECIALISTS IN MOBILE RADIO FOR 21 YEARS

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# Announcing ...

## Improved 600 BALDWIN Diesel

### for Better Low Cost Power!

#### NEW

#### ECONOMY FEATURES

- Large Dynamically Balanced Crankshaft
- Welded Alloy Steel Frame and Bedplate
- Four-Valve Cylinder Head
- Balanced Connecting Rods and Piston Assemblies
- High Pressure Turbocharger

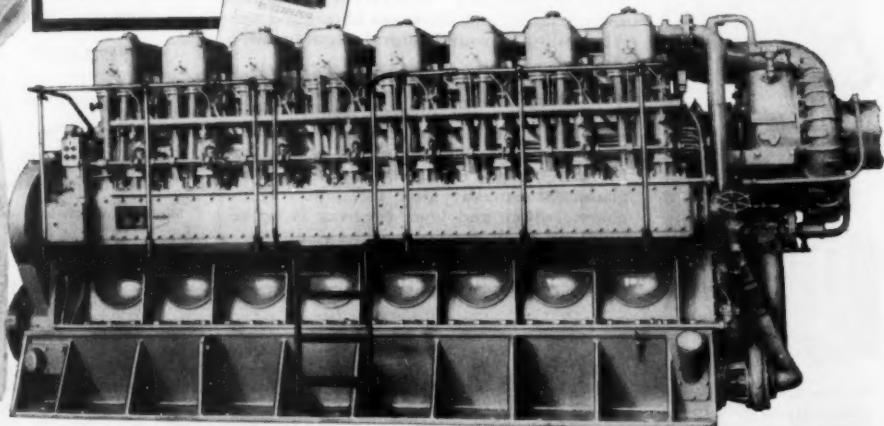
**FREE BOOKLET:** Write today for your copy of Bulletin 321, describing the many extra advantages of the improved Baldwin 600 Diesel.

BALDWIN

Write for your copy of Bulletin 321

Today

Write for your copy of Bulletin 321



## BALDWIN-LIMA-HAMILTON

Baldwin-Lima-Hamilton Corporation • Philadelphia 42, Pa.

Offices: Chicago, Cleveland, Hamilton, Houston, Lima, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, Washington

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formed under  
vacuum  
for greater  
strength

## Vitrified CLAY PIPE

**DE-AIRING** — a process that makes Clay Pipe stronger for greater load-bearing, denser for less absorption, and dimensionally truer for faster installation — takes place in a vacuum press as the pipe is precision-formed under pressures as high as 75 tons.

De-airing, like the exclusive Vitrification process, is an outstanding example of technology at work for you . . . bringing you *better* Clay Pipe — stronger, denser, truer lengths for every sewerage and drainage use. Industry-wide research is constantly improving the traditionally high quality of Vitrified Clay Pipe — and developing new test procedures to *insure* consistent standards.

Vitrified Clay Pipe requires no "extras" . . . no special coatings to protect it from deterioration. It is corrosion-proof *throughout* — completely immune to destructive chemicals in soil, sewage, or industrial waste. You can specify it *safely*, with complete assurance that Clay Pipe *never wears out*.



### NATIONAL CLAY PIPE MANUFACTURERS, INC.

100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.  
204 Connally Bldg., Atlanta 3, Ga.  
703 Ninth & Hill Bldg., Los Angeles 15, Calif.  
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio



SPECIFY *Vitrified*

# CLAY



# PIPE



### WRITE FOR DETAILED INFORMATION

Additional information and data on Vitrified Clay Pipe, Wall Coping and Clay Flue Lining sent **FREE** on request. State your specific questions. Simply contact the regional office nearest you.

C-151 9

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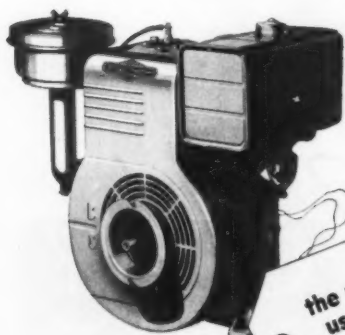
*More  
than*

**5,000,000**



The performance record of more than five million Briggs & Stratton single-cylinder, 4-cycle, air-cooled engines speaks for itself.

BRIGGS & STRATTON CORP., Milwaukee 1, Wis., U.S.A.



"Preferred Power"  
for home, farm and industrial  
equipment—powered  
by gasoline engines.

the world's most widely  
used single-cylinder  
gasoline engines

*World  
Wide*  
FACTORY  
SUPERVISED  
SERVICE

In the automotive field Briggs & Stratton is the recognized leader and world's largest producer of locks, keys and related equipment.

Thousands use our Readers' Service card to keep up to date . . . do you?

## LETTERS

TO THE  
Editor

### LETTERS FROM OUR AUTHORS

Your check for my contributed article was a delightful surprise. A file "PUBLIC WORKS—Contribution Suggestions" is now set up to remind me to stay on the beam. Each month I will be on the alert for material for us to use in our road work. Wishing you continued success and satisfaction for 1951, I am,

Albert M. Zuill,  
Ass't. Supervisor of Roads,  
Natrona County, Wyo.

Your kind letter of Dec. 20 and its "enclosed token of appreciation" combined to make two of the most prized presents Santa Claus tucked into my 1950 sock. Many thanks and a Happy and Successful New Year to you and to PUBLIC WORKS.

Albert L. Genter,  
Baltimore, Md.  
Consulting Engineer,

This will thank you for the marked copies, the check and your letter of Dec. 20. The check was a surprise as I would and did consider publication in your magazine plenty consideration. I always read it with much interest.

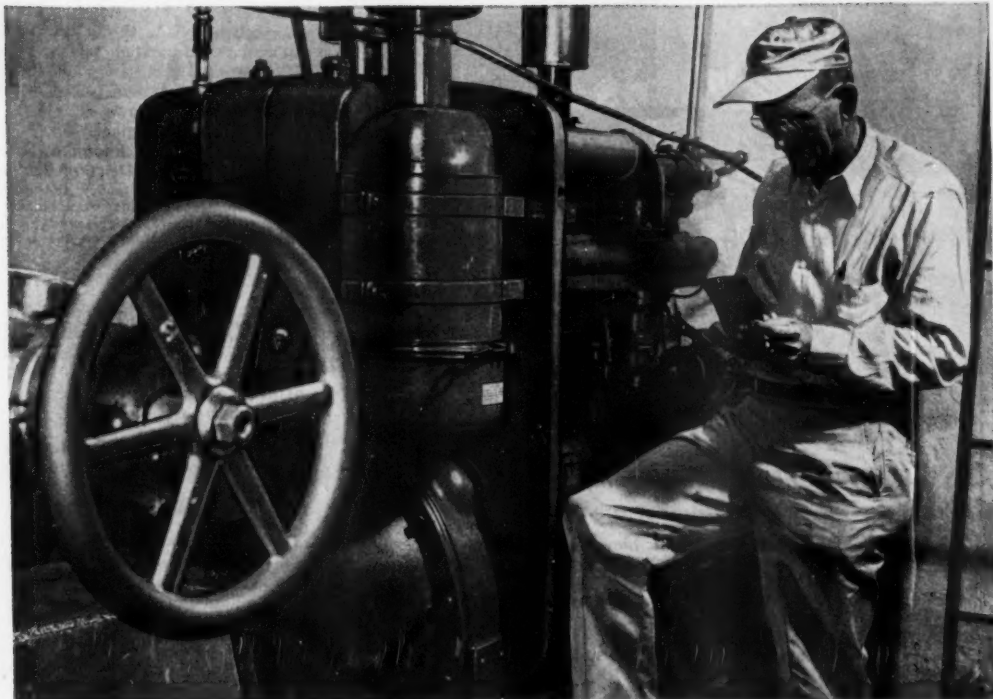
C. C. Washington,  
County Engineer & Surveyor,  
Galveston, Texas.

Thank you for your letter of Dec. 20 with the check for the article. The check is important, but I appreciate the contents of your letter even more. I will look harder than ever before for material that may be acceptable to you.

Guy Browning Arthur,  
Daytona Beach, Fla.

### SEWAGE PLANT OPERATION

Your article on the operation of sewage treatment plants in the October issue has been noted with interest. We have a large number of new sewage treatment plant operators in this state and it is believed



**Saved City's Life:** This International UD18-A took over single-handed when main water works pump motor failed.

# "SOME PUMPIN'"

## says Pompano of UD 18-A

Down in Pompano Beach, Florida, an International UD18-A Diesel was put in the pumping station on a stand-by basis. Eight weeks later the main motor and switch burned out, and the International took over. Running steadily and alone, it supplied 850,000 gallons of water a day to 12,000 people. "It not only saved MY life," says Water Superintendent Smith, "it saved the city's, too!"

Other International diesel and gasoline power units help put

the "work" in public works in thousands of communities, in dozens of ways. They're equal to emergencies, ready for steady service day in, day out. They're yours in eleven sizes, up to 180 working h.p. Your International Industrial Distributor or Power Unit Dealer has the whole story. See him now—and plan to make your budget for power go further with "Power that Pays!"

**INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.**

**INTERNATIONAL**



**POWER THAT PAYS**

Now's the time to mail this month's Readers' Service card.



## SHOPPING FOR BLOWERS?

**Look at R-C dual-ability with its wide selection to suit almost any job**

Asking Roots-Connersville about blowers, exhausters and gas pumps has been standard practice among buyers for almost a century. That's because building such equipment is the only job we do. We're outstanding specialists in handling gas and air.

You'll gain from our wide varieties of sizes, types and capacities from 5 cfm to 100,000 cfm. We're the only manufacturers offering you the *dual-choice* between Centrifugal and Rotary Positive designs—and that *dual-ability* is important when it comes to matching the units to the jobs to be done.

So—when shopping, be sure to call on Roots-Connersville, the specialists. When you're interested in vacuum pumps, meters or inert gas generators, we're equally well fitted to fill these needs, too.

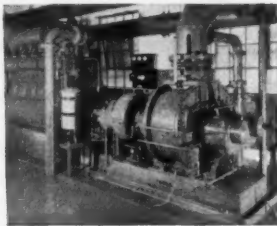
**ROOTS-CONNERSVILLE BLOWER CORPORATION**  
510 Poplar Avenue, Connersville, Indiana



Installation of 2-stage Centrifugal Blower in southern sewage treatment plant. Capacity 13,500 cfm.

One of two Rotary Positive Blowers, engine driven, in small sewage treatment plant. Capacity of each, 4,750 cfm.

**ROTARY**



# ROOTS-CONNERSVILLE

ONE OF THE DRESSER INDUSTRIES



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that copies of this article would be of much benefit to them. We would appreciate information on the cost of reprints, in batches of about twenty-five at a time.

Robert P. Lowe,  
Associate Engineer  
Div. of San. Engrg. & San.  
New Mexico Dep't. of Health

**Ed. Note.**—It is our policy to make these reprints available at minimum cost, without red-tape delay and without placing any liability on the individual.

## BOOKS IN BRIEF

### PUBLIC HEALTH ENGINEERING

This is Part 3, Vol. II, long awaited, of the outstanding text on Public Health Engineering by Prof. Earl B. Phelps. Part 3 deals with the third major division of man environment—food; and it also includes refuse handling and rodent control. Walter Tiedeman, so widely known in the food control field, has collaborated in this volume.

The chapters of Vol. II include: The relation of food to disease; milk production; pasteurization of milk; auxiliary processes and equipment; milk plant inspection and control; shellfish production and control; public eating and drinking places; and the handling and disposal of garbage, refuse and municipal wastes, with rodent control.

This volume is smaller than its predecessor, containing 210 pages. It is published by John Wiley & Sons, Inc., New York 16, N. Y., and sells for \$4.

### STATICS & STRENGTH OF MATERIALS

This is an elementary text covering statics and strength of materials and is designed for men who have not had mathematics beyond algebra and trigonometry. Many problems are included to familiarize the student with methods of procedure. By J. O. Draffin and W. L. Collins, both University of Illinois. Ronald Press Co., N. Y. 392 pages; 467 ills. \$6.50.

### UNDERPINNING

This is the second edition of a book first published in 1931. It has had a great deal of material added so as to bring it completely up to date. A special addition is an introductory treatise on soil mechanics.



BUILDER PREFERENCE IS GROWING . . .

PUBLIC DEMAND IS GREATER!



# Youngstown Kitchens

## FOOD WASTE DISPOSER



Typical illustration of what builders think of the Youngstown Kitchens Food Waste Disposer. Mace Properties sign declares that this new and progressive community has "No garbage! No alleys!"



Communities all over the country—large and small, old and new—are fast recognizing the values of automatic food waste elimination . . . and particularly of the Youngstown Disposer.

Now that builders and public alike are showing constantly increasing favor for banishing garbage forever, more and more people are learning this: *the Youngstown Disposer is 3 ways best!*

**1. CONTINUOUS FEED**—No "stop-and-go" action with the Youngstown Disposer. Food waste can be fed in continuously, with no load limits, no stopping between loads.

**2. SELF-CLEANING**—Automatic reversal of the rotary shredders changes direction of the water swirl for complete self-flushing. Waste is shredded thoroughly into tiny particles that act as a cleansing agent.

**3. LONG LIFE**—Self-reversing action doubles shredder life, because two sets of shredder edges do the work instead of just one set.

For these reasons—and many others—the Youngstown Disposer is marvelously service-free. From your own viewpoint, and the viewpoint of the public, consider these points of superiority.

**MULLINS MANUFACTURING CORPORATION**  
WARREN, OHIO

*World's Largest Makers of Steel Kitchens*

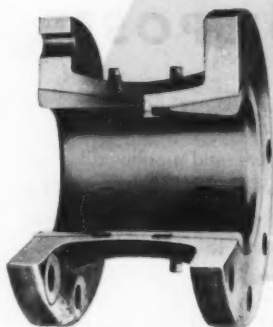
### TAKE THE LEAD IN YOUR COMMUNITY IN ABOLISHING THE GARBAGE NUISANCE!

Need more facts about advertised products? Mail your Readers' Service card now.

# FOSTER FLOW TUBE\*

(Gentile Patents)

**SHORT...not long!**



The picture above sectionalizes one of our standard 12 inch Foster Flow Tubes. Put a rule on it, lengthwise and diametrically. What do you make the length-diameter ratio? About  $1\frac{1}{2}$  to 1?

Yes,  $1\frac{1}{2}$  to 1 is about the maximum ratio of length to diameter in the Foster Line of Flow Tubes in sizes 3" and above. Some units have less than a 1 to 1 ratio, particularly when high velocities are encountered. What does this mean to you in the way of installation costs and housing? You can readily picture how easy it is to set the Tube in a line. Just like a section of pipe. And with this compactness is an accuracy which not only equals the accuracy of conventional long primary devices but in most cases exceeds it. This is due to the greater pressure differentials for any given main-to-throat reduction.

Yes, you get great compactness and ease of installation with the Foster Flow Tube. You also can count on satisfactory accuracy. As for your specific applications, write us in detail giving both processing and installation requirements. Standard sizes come in all commercial pipe diameters, flanged or screwed connections. Standard lining is bronze; other metals to order.

\*A Proved Flow Tube Added to Foster Line of Regulating Valves

## FOSTER ENGINEERING

835 Lehigh Avenue • Union, N. J.

PRESSURE REGULATORS...RELIEF AND BACK PRESSURE VALVES...CUSHION CHECK VALVES...ALTITUDE VALVES...FAN ENGINE REGULATORS...PUMP GOVERNORS...TEMPERATURE REGULATORS...FLOAT AND LEVER BALANCED VALVES...NON-RETURN VALVES...VACUUM REGULATORS OR BREAKERS...STRAINERS...SHEDS...SAFETY VALVES...FLOW TUBES

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By Edmund Prentis and Lazarus White. 362 pages. Columbia University Press, N. Y. \$10.

### COFFER-DAMS

A little over your reviewer's head, but this second edition seems to contain everything you want to know about cofferdams. It is, says the cover blurb, the only engineering book devoted entirely to the scientific design of cofferdams. By Lazarus White and Edmund Prentis. 304 pages; 201 illustrations. Columbia University Press. \$10.

### CRUSHING, SCREENING & WASHING

Facts and Figures is the title of the booklet of information on crushing, screening, washing, materials handling and aggregates which is available from Pioneer Engineering Works, Minneapolis 13, Minn. It contains 62 pages covering stage reduction and capacities of crushers, capacities of screens and how to select conveyors and feeders; also data on horsepower, sizes of stone produced, and lots of other useful information. Write for a free copy.

### ION EXCHANGE RESINS

This book contains a summary of the theory and practice of ion resin exchangers and assemblies much of the scattered literature available in the field. The authors are Drs. Kunin and Myers of Rohm & Haas and the book is published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

### MUNICIPAL AFFAIRS

This book, designed for civil engineers, combines city government fundamentals with city management, giving special attention to utilities, including those municipally owned. By E. W. Steel. International Textbook Co.; 367 pp. \$5.50.

### WATER QUALITY & TREATMENT

This is the second edition of "a manual of the American Water Works Association prepared by leading authorities in each branch of the field of water purification." It is obviously impossible, within the space limits available, to give any adequate review of a text of such substantial comprehensiveness and authority. It is a book that every water works engineer ought to have available for handy use and refer-

ence for it will aid him in solving many of the problems that arise in day by day work. The 422 pages are well illustrated. It is published by the American Water Works Association, 500 Fifth Ave., New York 18, N. Y., and sells for \$5.

### LEADERS IN PUBLIC WORKS

**Allen H. Rogers** is Superintendent of Public Works of Garden City, Long Island. His picture on the front cover was taken in his office after years of effort and was pried from his family after a real ordeal. For the background, he suggested a composite of every conceivable kind of public works, with inserts of aspirin, but our artist developed the picture along other lines.

Mr. Rogers, who is well known in public works engineering circles, is a graduate of Cornell Engineering School, 1924. He has been Superintendent of Public Works and Village Engineer of Garden City since 1930. His special contribution to public works engineering is the system of municipal parking fields for which Garden City is so well known. He was consultant to the Office of the Chief of Engineers on refuse collection practice during World War II. He is treasurer of the American Public Works Association and member of the AWWA, NYSIWA, the Society of Military Engineers and the ICMA.

He is married and has a son who is staff sergeant in the Air Force, presently overseas. His daughter is a sophomore at college. He says he does not have much time for hobbies, except for a summer cottage "out east" (presumably the far reaches of Long Island). He is a licensed professional engineer and a member of the Garden City Planning Commission and the Garden City Traffic Commission. Though too modest to mention the fact, his ideas and his energies have made him well known far beyond Long Island limits and have fully earned him the rating of a place on our cover. It is with much pride in his engineering abilities that we show his picture there this month.

**Now you can lay up to 12" thickness  
11' wide; lesser thicknesses to 12½'**

**JAEGER Paver-Type  
AGGREGATE SPREADERS**  
for both base and surface aggregates,  
free-flowing hot or cold bituminous mix-  
tures, plant-mixed stabilized soil.

**Cost ½ the price**  
of bituminous pavers and are better  
adapted to lay base materials. Also  
lay top on macadam and bituminous  
secondary roads, parking areas, drives.

**All traction on subgrade**  
No displacement of loose material.  
Crawlers or 4-wheel drive, to suit.

In one pass you can now lay as much as 10" of coarse stone, or as much as 12" of finer or graded materials, in 10' to 11' widths, or the same volume of material in greater widths to 12½' with slightly less thickness. Or lay up to 25' with two of these low-cost spreaders in tandem. Place material as fast as trucks can deliver, to accurate thickness maintained by straightedge runners; blend perfect joints. Proved on hundreds of jobs, from Pennsylvania and New Jersey Turnpikes to city parking lots. Two models, to work with any size trucks.

See your Jaeger distributor now — or send for Catalog SP5-1

## THE JAEGER MACHINE COMPANY

400 Dublin Ave., Columbus 16, Ohio

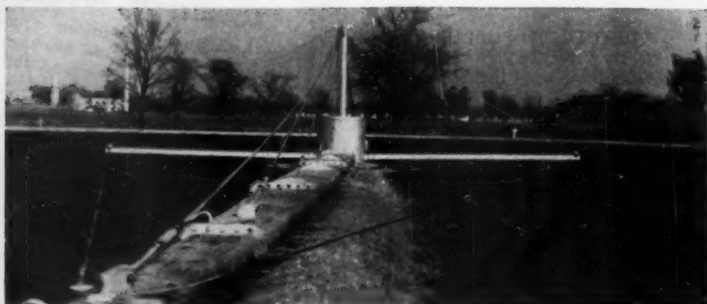
BITUMINOUS PAVERS • CONCRETE SPREADERS, FINISHERS • COMPRESSORS • PUMPS

Thousands use our Readers' Service card to keep up to date . . . do you?

## For Better Trickling Filter Results

**Use Good  
Equipment**

**Use TFF Institute  
SPECIFICATION  
Underdrains**



120 ft. KC Dorco Distributor recently installed at the new Waukesha, Wisc. sewage treatment plant

Trickling Filter Floor Institute *specification* underdrains are used in all modern filters where better results and trouble-free operation are desired. They are scientifically designed for that purpose and made of the finest quality vitrified clay. The size of the top openings insures proper ventilation of all the filter media and free discharge of the filter effluent. The run-off channels are extra smooth for non-clogging, quick drainage.

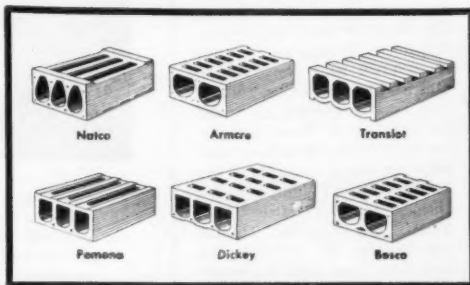
These blocks will carry applications up to 50 MGAD. Unskilled labor can lay them easily because they are light-weight and self-aligning. And the blocks are strong enough to work on after laying and to support safely even very deep filter media. They are best for all kinds and shapes of filter.

On your next filter, use the best equipment you can get . . . and give it a *specification* floor of *Vitrified Clay Filter Bottom Blocks*. Ask any member of this Institute for full engineering details. Write today.

This DORR CO. distributor at Waukesha, Wisc. is quality equipment. With 33 years of research and practical experience in back of it, the designing engineer could be sure in advance it would live up to expectations.

But no filter can be any better than its floor. So like good engineers everywhere the designer of this plant made sure this quality mechanical equipment had a *specification* floor of *Vitrified Clay Filter Bottom Blocks* . . . the best kind of filter floor obtainable.

**These one-piece blocks are: Easy to Lay, Acid Resistant,  
Proved by Use and Won't Clog.**

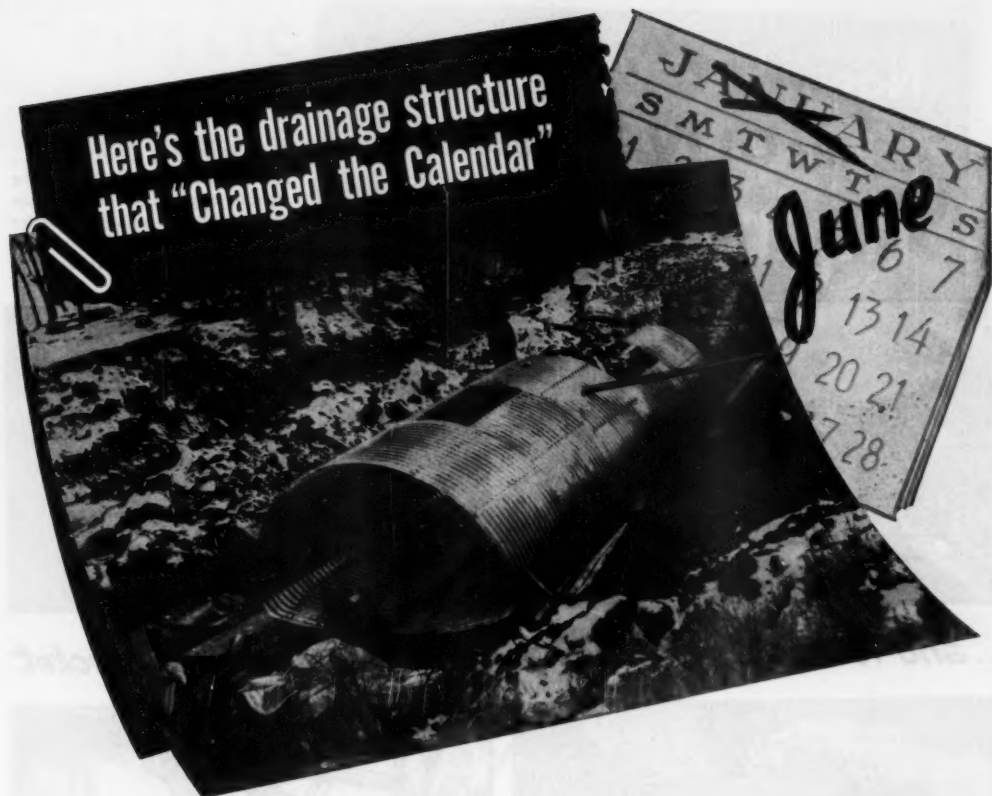


## TRICKLING FILTER FLOOR INSTITUTE

National Fireproofing Corp. Bowerston Shale Co. Pemona Terra-Cotta Co. Texas Vitrified Pipe Co. W. S. Dickey Clay Mfg. Co. Ayer-McCauley-Reagan Clay Co.  
Pittsburgh 22, Pa. Bowerston, Ohio Pemona, N. C. Mineral Wells, Tex. Kansas City 6, Mo. Brazil, Ind.

Get full details of this month's new products . . . mail your Readers' Service card today.





It used to be that the construction season ended when winter began.

But now, thanks to Armco MULTI-PLATE, you can install large sewers, stream enclosures and similar structures the year around. Pre-curved, corrugated metal sections are bolted together on the job to form sturdy, long lasting, full-round pipe, arch or PIPE-ARCH. No curing, no delay. The job is done quickly with a small unskilled crew. Costs are low.

Later on, should conditions change, your MULTI-PLATE structure can be extended or salvaged for use elsewhere. There is no loss of material.

MULTI-PLATE is just one of the many Armco Drainage Products designed for year-around installation. There's Plain Galvanized Armco Corrugated Metal Pipe for culverts and similar uses, Armco PAVED-INVERT Pipe to combat erosion and Armco ASBESTOS-BONDED Pipe for severe corrosive conditions. Where headroom is limited, Armco PIPE-ARCH solves the problem. Write for the complete story. Armco Drainage & Metal Products, Inc., 1941 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

## ARMCO DRAINAGE STRUCTURES



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### It's Smoother Operating...

No hesitation or "jerks" in the smooth application of hydraulic power. You get smoother, easier handling... more positive control with less operator fatigue.



*..and it has a Sensational New "Forced Ejection" Bucket*



By simply reversing the bucket and dipper stick, you get a swing loader that loads out material faster than you'd believe possible. "Forced ejection" bucket is available as optional equipment. Standard trencher bucket and standard swing loader bucket are available at slightly lower cost. With standard loader bucket, loading height is 12 feet. Loading height with "forced ejection" bucket is 12½ feet.

The "forced ejection" bucket gives you quick, clean, complete discharge of even the stickiest materials. Bucket gate is hydraulically controlled and travels the complete length of the bucket to "force" out all material.

For complete information on this all-hydraulic, tractor-mounted trencher and swing loader, see your Oliver Industrial Distributor or mail the coupon.

Have you seen the Oliver color movie, "Task Force on Wheels"? Your Oliver Distributor will be happy to arrange a showing.



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A complete line of Industrial Wheel and Crawler Tractors

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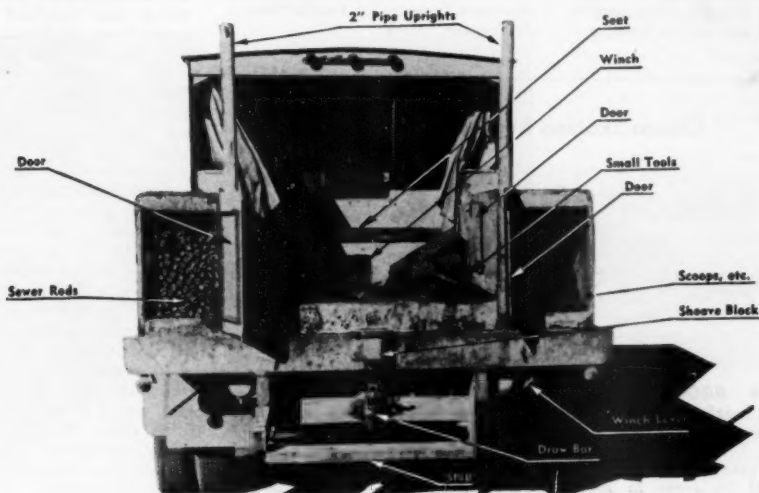
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● JAMESTOWN'S sewer maintenance truck.

## Better Ways of Using MOTOR TRUCKS

● In response to a letter from Public Works, a number of cities have described the devices and methods by which they have adapted equipment to more efficient specific use. In general, these are described in the words of the local engineer or superintendent, and the photographs and sketches were furnished by them.

### Sewer Maintenance Truck

THE sewer maintenance truck for the city of Jamestown, N. Y., is a Dodge, 1½-ton flat bed truck, mounted on 6.50"x16" tires, duals in rear. The tool carriers, winch and control lever, and the auxiliary cab, were built on the flat bed truck by Fritz Berg, mechanic in the Jamestown Department of Public Works. A brief description follows: On both sides of the flat rack are tool car-

riers of sheet metal 14" wide by 24" high by 8'9" long. Doors at the rear end serve the rear end compartments which are 40 inches long and are formed by sheet metal partitions.

Looking at the truck from the rear, the left compartment holds about 175 sewer rods and the right compartment contains scoops, buckets, spears and all of the necessary tools for opening or cleaning a fouled sewer. The forward 5 feet 5 inches of each compartment con-

tains shovels, picks, sheaves and small tools necessary for sewer maintenance. These compartments have access doors on the inside of cabinets. The cabinet on the left side also has a small door near the front on the outside.

Immediately behind the truck cab and above the flat rack is mounted a winch, powered from the take-off. The control lever for the winch is at the rear of the truck bed and below and to the right of its center. In the center of the truck bed at

the rear end is mounted a sheave block. Also, at the rear end are two 2-inch pipe uprights which are used for mounting a detachable cross arm supporting a sheave. Immediately in the rear of the truck cab and over the winch is built a plywood cab 46" deep and 54" high. In addition to the above equipment is a draw bar for use in hauling a

2-wheeled trailer upon which is mounted a Flexible sewer rod reel and accompanying equipment.

The truck was developed at the suggestion of Pete Nalbene, the sewer maintenance foreman, who has spent many years servicing the city sewer system.—*L. A. Fletcher, Assistant Director of Public Works, Jamestown, N. Y.*

### Cleans Skating Rinks Faster



● **BROOM and snow plow blade on motor truck keep St. Cloud kids happy in winter.**

**S**KATING rinks in St. Cloud, Minn., total 16 acres in area. For faster and better cleaning a new 2-ton truck was ordered with: "One 7-ft. sweeper, mounted in front, driven by truck motor without drive belts; one 9-ft. hydraulic side wing with 10-ft. moldboard, so mounted as to move all sweepings from the broom to the right." Philip H. Nierengarten, Superintendent of Parks, requested the mounting of the attachments as ordered because the truck would provide speed; a truck can be readily weighted to push the deeper snow that comes when the ice is thicker; and the 2-speed axle is adaptable to varying speeds and conditions

of use. Dual wheels were requested so the outside wheels could be removed when not needed. The 7-ft. broom and the 10-ft. blade were so placed as to clear the wheels and leave no wheel tracks on the ice after cleaning.

This has proved very satisfactory. The equipment will remove an inch of snow and slush from the 16 acres in less than 6 hours. The largest rink on Lake George, 9¼ acres in area, can be cleaned of snow 1 inch deep in three hours.

By removing these special attachments, the truck can be used all the year around for other park work.—*James D. Gray, City Engineer, St. Cloud, Minn.*



● **SIDE view of the unit to keep skating rinks clean of snow.**

### Pouring Curb and Gutter Direct from Dump Truck

**I**N Mount Pleasant, Mich., concrete for curb and gutter work is mixed at a central point. Formerly, it was placed in dump trucks which were unloaded to curb and gutter forms by hand, for the most part. We felt time could be saved if the concrete could be chuted directly to the forms as the truck moved along, but the usual dump body does not rise high enough to permit this.

In purchasing a new dump truck, we specified a body with a chute in the tail gate; a 6-inch removable sub-frame so the mounting height would be 21 ins.; and a dumping angle of 60°. A semi-circular steel trough was then made to carry the concrete to the forms. One end of the trough is welded to a pipe which fits over a bar welded to the truck chassis and holds that end of the trough in place. The other, or distant, end of the trough is supported by a chain. This is necessary for flexibility because as the body is raised, the discharge end of the trough is lowered.

This idea, which was developed by our street superintendent, has saved quite a bit of time in placing concrete in curb and gutter forms.—*Allan J. Kronbach, City Manager, Mount Pleasant, Mich.*

### Weed Sprayer for Along-the-Curb-Spraying

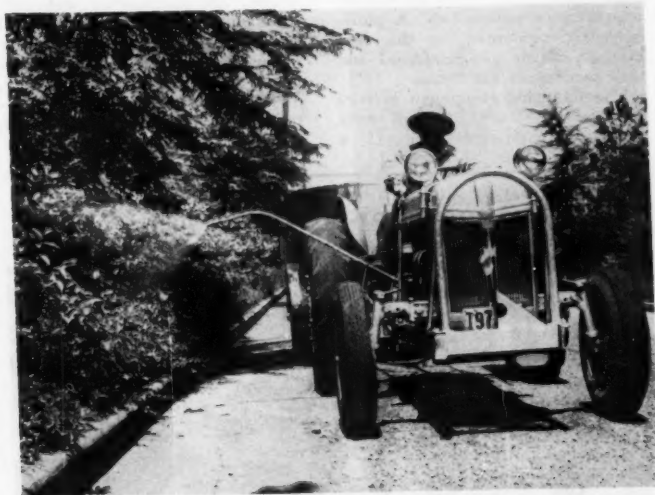
**F**OR spraying areas along streets where there are no sidewalks and the weeds grow close to the roadway, we have developed a weed sprayer.

A small gasoline pump and a 100-gallon barrel are mounted on an obsolete fire truck trailer. The pump is controlled by the sprayer of a small tractor and maintains, when in operation, an 80-pound pressure. The operator of the tractor operates the pump, guides the spray nozzle and drives the tractor as one operation. The spray nozzle used is an ordinary good quality garden spray nozzle and breaks the 2,4-D mixture into a fine spray spreading back from the curb approximately 2 feet. We have recently had to control this spray by a small canvas shield so it will not drift into yards and affect shrubs and trees. The



2,4-D mixture that we use is a 5% solution. We have found this spray very effective on honeysuckle and other broad-leaf plants which may be growing over the curb, and it has proven its efficiency in eliminating these plants in the area sprayed, thus preventing entanglement of

this particular kind of plant in our mechanical equipment. This equipment can cover approximately five miles of streets per day, and we feel that it has been very successful—Robert S. Hopson, Chief, Bureau of Operations, Department of Public Works, Richmond, Va.



● **ALONG-the-curb sprayer, mounted on a trailer, is pulled by a small tractor. Five miles of streets can be treated daily.**

### A Truck Equipped for Water Works Service



● **WATER service truck has many facilities.**

**I**n the early spring of this year, we purchased a 1950 Chevrolet  $\frac{3}{4}$ -ton truck chassis with standard cab, heavy duty four-speed transmission, 7.00 non-directional 8-ply tires rear and 7.00 plain grip 6-ply front, cab to axle dimension of 48 inches. On this truck we had mounted by Baker Equipment Engi-

neering Co., Charlotte, N. C., an American 4460 general service body 90 inches in length. This is the type of body that is widely used by the service departments of telephone and electric power companies.

The sales engineer for Baker Engineering Co. worked out a very convenient arrangement for mount-

ing a pipe vise on the right rear of the truck and a pipe holder at the front. When not in use the vise can be removed by taking out one lock pin and stored in a locked compartment; and the pipe support at the front folds back between the body and the cab so that nothing protrudes beyond the body lines.

The shelves in the vertical compartments are adjustable and also the partitions in the horizontal storage bins. The arrangement is ideal for storage of plumbing supplies, meters and repair parts, pipe wrenches, boots, water cooler and sundry needs on a service truck. A sliding bar lock on each side simplifies locking.

The truck is also provided with spot light; a large red STOP light on the rear that can be turned on by a switch for the protection of men operating valves in street at night; and a heavy duty tow hitch for towing the air compressor. We have also lined the interior of the bed of the truck with flat steel plate  $\frac{3}{32}$ " in thickness to protect the body from damage. We have other trucks for heavy hauling, including a Power Wagon ( $1\frac{1}{2}$ -ton four-wheel drive) equipped with a winch lift for handling of large pipe and fittings.

Our new water service truck meets with our every expectation and need and is a valued addition to our water service equipment. Our system is 100 percent metered and we have approximately 2100 services.—F. G. Doggett, Supt. of Water and City Engineer, Mount Airy, N. C.

### Faster Curb and Gutter Construction

**A** CURB and gutter paving machine and a truck equipped specially to transport this machine quickly from one location to another has paid off for Bay City, Mich. The Dotmar curb and gutter machine speeded up the work. Study was given to methods of moving the machine across street intersections and from one job to another. Portable tracks proved unsatisfactory, as did use of a trailer. A hoist was then placed on top of a dump truck, and this worked well. A frame of steel sections was erected on the truck body and an I-beam, with a chain fall, was fastened at the top. With this equipment, the curb and gutter machine can be hoisted up

in the air and moved where needed or readily worked on. The hoist is so constructed that it can be removed easily from the truck when the curb and gutter season has closed. The hoist has done well, but if we were going to do it again, we would use lighter materials.—*R. K. McGillivray, Director of Public Works, Bay City, Mich.*

### Boxes Help in Snow Removal

**W**E have found large boxes mounted on our trucks very helpful in hauling snow, leaves and brush, in alley cleanups and, in fact, in much of our work.

The first two boxes we used were rebuilt in our shop and are 7½ ft. wide and 9 ft. long with the regular sides and a sheet iron front 3 ft. higher than the sides. This front is permanent and has slots cut in for rear vision in line with the rear window of cab. Two-inch angle is fastened to the front corners of the box which supports the 3-ft. front sheet and also is used to fasten the extra high sides. The sides are made of ¾" hardwood and fastened with two bolts to the angle in front and bolted to a steel plate on the rear of box. A tie rod was used to hold the sides from spreading. This was installed about half-way and near the top of the high sides, but with solid angles at the front and rear this was found unnecessary. The tailgate was later widened to the same width as the box. As we used a front-end loader to load snow into it, the tailgate could not be extended to the height of the box. Now we have a Barber-Greene snow loader and we will make a tailgate the same height of the sides. The top half will swing from the top on hinges which will be fastened to a bar which will also help to keep the sides at the rear from spreading.—*Tony Eikey, Supt. of Public Works, Traverse City, Mich.*

### Water Department Utility Truck

**F**OR our new Cloquet, Minn., water department truck, we specified a 1-ton truck because we will use it to carry heavy materials, as hydrants and valves; and, also, at times to tow a 210-ft. air compressor, a tank car heater, a 3-ton to 5-ton street roller, or an electric pipe thawing generator. At times, we

may use the truck on street work. We also specified a 6-volt, 30-amp., low speed cut-in type generator. We have had trouble, especially in cold weather, in keeping the batteries charged on our light trucks. Dual electric windshield wipers represent standard practice for Street Department trucks, as in heavy storms and snows the regular wipers are unsatisfactory. A pintle hook was mounted on the rear bumper, which was reinforced and well secured to the frame.

The following equipment is carried on the truck: (1) all tools necessary for tapping a main; (2) a

map showing the location of all valves in the distribution system; (3) shut-off rods for valves of all size; (4) lubricant, packing and other parts for servicing hydrants; (5) equipment for making the regular weekly water level measurement in our five deep wells; (6) a dip needle and tape; (7) pick and shovel; (8) corporation and curb cocks; and (9) miscellaneous small tools used in replacing a water meter, or straightening or repairing a stop sign.—*Bruce R. Boyer, Street Commissioner and Superintendent of Water Works, Cloquet, Minn.*

### Pushing up Leaves in Princeton



**T**HE old idea of burning leaves in the street or even in the yard is past. Hard paved streets, surfaced with tar or asphalt are damaged by fire and smoke and the fire is a hazard to property. Leaves must be collected in the fall (September 15 to December 15) and this has become a major problem to most municipalities. New equipment has kept fairly well apace with the demands in connection with this operation.

In Princeton Borough, N. J., where we have 3,000 trees along the curb, as many more in back of the sidewalk and twice as many in private yards, over 3,000 cubic yards of leaves are produced. Local officials decided about 1940 that the collection of these leaves was a necessary municipal service, and allowed property owners to rake the leaves into the streets from their premises.

About three years ago we purchased a Leaf Loader which sucks the leaves from the street and discharges them into a truck with spe-

cially built tight body of five cubic yards capacity. A local nursery now furnishes two trucks so equipped which keep the loader busy. The nursery finds the crushed leaves excellent for winter protection to shrubs and trees. We found that it was necessary to push the leaves up in piles to get the best efficiency out of the loader so a homemade leaf rake was built using steel wire for the brush broom or bottom and heavy wire mesh about a "U" pipe frame. The rake is fastened to and raised or lowered by the snow plow mechanism attached to the front of a jeep. It is particularly efficient when the leaves are wet because they can not be lifted by the vacuum loader and we must then use a front end loader or move them by hand. Such an arrangement saves our sweeper for it is not good economics to use an expensive sweeper just for pushing leaves.—*I. Russell Riker, Borough Engineer, Princeton, N. J.*

## To Tree Trimmer from Bomb Carrier

**A** FORD truck, a 1943 model, which had been used as a bomb carrier, was obtained from Army surplus by the City of Akron, Ohio, and converted for use in tree maintenance. An aerial ladder was purchased and installed on the platform for tree trimming; a power winch was already in place on the front of the truck and this is used for pulling stumps. A hoist frame and hand operated hoist on the rear is used for loading stumps and logs onto the truck. This makes a very efficient piece of tree equipment.—*R. S. Barnhardt, Superintendent, Parks Division, Akron, Ohio.*



## Emergency Sewer Truck

**N** EED for a new and different type of truck to take care of emergency sewer stoppages in the City of Wichita, Kans., was realized sometime ago. The old dump truck then being used was both inefficient and worn out. To remedy this situation, a 1-ton International chassis was purchased and a special body was designed for that chassis by Glen Rousseau, Foreman of Sewer Maintenance for the City of Wichita. The body was built by the Kirk Brake and Motor Service Company. It has served very satisfactorily, although there are improvements which can be made to the body if and when another such body is needed.

As will be noted from the illustration, "Flexible" sewer rods are carried between the cab and the body of the truck. These sewer rods are mounted so that the reel operates without removal from the truck and the rods can be removed or put back on the wheel very easily. The rack shown on the side of the truck is to protect the fire hose when it is stretched across the street pavement. The fire hose reel is mounted in the body proper, and this reel is operated through a clutch mechanism by power take-off equipment mounted beneath and on the right side of the body. The remainder of the truck bed serves to hold the "Flexible" rod gasoline engine and other tools.

The separate compartments in the truck body were designed for specific purposes. A door is located in the lower right-hand corner of the truck, which door is used for long-handled shovels, bars, etc. The other compartments also have their individual uses.

The cost of this truck body was a little over \$900. It has proved to be very satisfactory and has increased the efficiency of our work in removing sewer stoppages quite appreciably.—*Geo. J. Fisher, Supt. of Sewers, Wichita, Kans.*

(More on page 86)

## Truck for Street and Traffic Signing

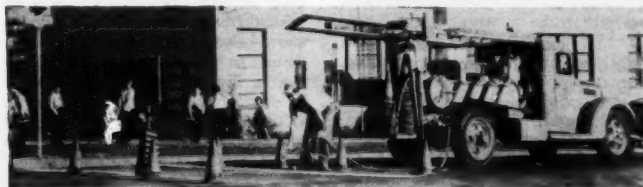
**W** E used a 2-ton Federal truck chassis for building our all-purpose unit for marking streets and painting and erecting signs. A smaller chassis could be used, but not less than 1½-ton.

After much experimenting with compressors, a Smith Model "A" four cylinder compressor was purchased. It was mounted close behind the cab to equalize the weight and keep it convenient to the operator. An all metal bed was built around the compressor and to the rear of the truck, 10 feet in length with an 18-inch low step at the rear. Overhead brackets were then welded on. By using an all metal bed all brackets and braces could be welded for additional strength.

The overhead brackets are used for carrying sign posts, and street marking stencils. Brackets on the rear step carry shovels, brooms, post hole auger, crow bars, and other tools necessary for sign installation. The bed itself is large enough to carry extra paint, street

barricades and flares if needed. The traffic cones that are used as traffic control, when center striping, are carried on the rear step and are placed on the stripe as the truck moves. A 60-gallon paint pot is used, with pipes running to front and rear of the truck. The front lines are used when the striping machine is used as this has to be pushed by the truck. The striping machine is constructed to paint single or double stripes simultaneously, also broken or steady stripes.

The rear paint stripes are used for curb and crosswalk painting, or wherever it is not convenient to use the front pipes. A 60-gallon pot makes it possible to work the entire day without refilling on most jobs. This equipment also carries a 15-gallon auxiliary pot. This can be used on all types of painting where a spray gun can be used, buildings, bleachers, backstops, fences, and all equipment including automobiles and trucks.—*Doris Sullivan, City Manager, National City, Calif.*





## WASTE PROBLEMS OF INDUSTRY



WHEN industry recognized the fact that disposal of manufacturing effluents was a part of production, it was found that in many cases raw industrial wastes could not be discharged to municipal plants because the plants would become overloaded; or the type of treatment provided by the municipality was not amenable to the treatment of industrial wastes.

The solution to this appears to lie in one of two methods, depending on the volume and type of wastes to be discharged. First is pretreatment, consisting, for the most part, of equalization, neutralization, and oil and grease removal after which the waste is discharged to the municipal sewer for final treatment in the municipal plant. The other is for the industry to construct and operate its own waste treatment plant, discharging an effluent which will not overload the receiving waterway.

When either pretreatment or complete treatment of a waste is contemplated, a systematic organization of the problem is the first prerequisite. The organizational survey can be divided up into five general steps:

1. A study of the wastes which includes volume, composition, and origin.
2. A study of downstream condition.
3. Preconstruction studies to eliminate or reduce pollutants at the source; process changes; and pilot plant installations.
4. Preliminary plant design and cost estimates.
5. Final selection of method and degree of treatment and final plant design.

Pretreatment of wastes is often a comparatively simple procedure in that the goal is merely to modify

### CHARLES LOSE

the characteristics of the industrial waste to approximate that of sanitary sewage. Equalization by compositing eliminates surges of highly concentrated wastes so that the flow leaving the industrial plant constantly maintains the same characteristics. Neutralization maintains a constant pH, comparable to that of sanitary sewage. Grease and oil discharged in the effluent can be controlled through a small de-oiling installation.

When a higher degree of treatment is needed, particularly when the industrial effluent is to be discharged to a water course, the investigation by means of pilot plant operation can become quite involved.

#### Planning a Pilot Plant

We assume that any liquid waste can be reduced both as to solids and BOD through settling and biological filtration. The degree to which they can be reduced depends entirely on the characteristics of the industry and of its waste products. Although there are many industrial plants which manufacture the same basic products, no two plants manufacture exactly the same products or have the same volume of production. It thus follows that separate pilot plant operations for each industrial plant effluent must be conducted before any reasonable conclusion can be made as to what a full-scale plant will accomplish. Previously arrived at data from pilot plant operation at other plants will merely give an idea as to what may be expected, but the refinements developed for one operation cannot be assumed to apply 100 per cent to any other operation until proven so.

In approaching a pilot plant study, it is of primary importance that as

nearly representative samples of the effluent be obtained as possible. Where there are only one or two outfalls, the problem of obtaining representative samples presents no great problem. However, in some of our larger plants where there are as many as 40 or 50 separate outfalls, all discharging at different volumes, the collection of samples becomes more difficult in that tank truck collections are required to take the samples to a central point for compositing. At times collections of samples several times a day becomes necessary, due to the changing characteristics of the effluent over a 24-hour period. In such cases, direct continuous sampling from outfalls is preferable to tank truck collection.

Before construction of the pilot plant is started, a material survey of process wastes is desirable to determine volumes of wastes in solid form and those that are in solution, or water borne. Wastes in solid form can be incinerated, discharged to a dump, or in some cases digested.

If biological filtration is to be used, laboratory analysis of the composite waste will show if the waste is deficient in food value necessary for the development of bacteria. Chemical manufacturing wastes are usually deficient in food values, principally nitrogen and phosphates. A commercial fertilizer such as Agrico which contains nitrogen, phosphates, and potash can be added in small quantities, or ammonia and phosphoric acid can be used.

It has been found that a biological filter performs best at a pH between 6.5 and 7.5. Raw acid chemical wastes should be neutralized by lime or caustic to 6.5 before distribution over a filter. Even if the pH of the waste is 4.5, a satisfactory reduction in BOD can be attained. However, at pH below 6, a filamentous bacteria may develop which can completely

(Please turn to page 84)



**C**OUNTY highway road and bridge building and maintenance equipment, insofar as "usefulness" is concerned, may be divided roughly into three classes, none of which can be considered completely compartmentalized or rigidly classifiable:

(A) Heavy Use Equipment—used much of the calendar year in one capacity or another. Example—motor patrols, trucks, etc.

## HOW A POOR COUNTY CAN BE RICH IN

# ROAD EQUIPMENT

(B) Seasonal Use Equipment. Example—snow plows, water tank sprinklers, mowers, tar kettles, etc.

(C) Special Use Equipment. Example—bulldozers, end loaders, pile drivers, asphalt distributors, power plants, etc.

It is obvious that the annual hours of use of equipment, or what is here characterized as its "usefulness," will vary greatly with the size, wealth, geographical, climatic, and topographical location of the individual county. For instance, a snow plow in Minnesota is a necessity; in central Illinois it might be desirable; in Alabama it might be classified as a luxury. The "usefulness" of a snow plow, therefore, varies in accordance with climate and locality. Some equipment classified as above as "special use equipment" might also be classified as "seasonal use equipment." In fact, broadly speaking, most construction equipment is seasonal equipment. The above categories are therefore illustrative rather than technical.

### Even a Small County Needs Equipment

Even a small county with a paucity of funds is justified in making a substantial investment in equipment that has a high degree of usefulness. A motor grader, for instance, is markedly a piece of equipment of that type. First, it can be used for new construction as well as maintenance; second, it can be used in the winter season for the removal of snow; third, it has miscellaneous uses especially when equipped with appurtenances such as end and windrow loaders; it can be used to move or push heavy equipment; and lastly, being a one-man-operated vehicle and, nowadays, frequently powered by a diesel engine, it is very economical in both labor and fuel costs.

The higher the degree of "usefulness" a piece of equipment promises

### JAMES GRATTAN COONEY

Formerly Superintendent of Highways  
Clinton County, Illinois



● LEADS built for pile driver.



● TRUCK with sprinkling tank.



● TRUCK used in bridge building and repair work.

to a county highway department, the greater is the justification of its purchase, and the greater the utilitarian return on the investment.

Even a small county highway department is therefore justified in a substantial expenditure of funds for "heavy use equipment," the (A) equipment as above classified.

How much money should a small county highway department invest in the (B) and (C) type of equipment which have far lesser "usefulness"? For many counties it is more a matter of "can invest" than "should invest." For instance in

Clinton County, Illinois, with its 25,000 population, \$50,000,000 assessed valuation, and its 122 miles of county roads, it is a case of "can" rather than "should," financially speaking, but "constructionally" and "maintenancely" speaking, it is sometimes a case of "should" or even "must" invest in the (B) and (C) type of equipment.

Our own financial dilemma was solved with the help and the ingenuity of the County Highway employees and the encouragement and guidance of the Road and Bridge Committee and the County Superintendent of Highways. "If we cannot afford to buy it, we shall have to build it" has been the spirit of this highway organization.

### Standardization Simplifies Problems

For instance, faced with the replacement of an increasing number of dangerous or destroyed bridges, the county decided to standardize for the immediate present on the creosoted pile and timber type of bridge with steel girders. The bridges, being small to medium size, contract work would be unattractive to contractors and costly to the county. So day labor construction was chosen. The most important and costly piece of equipment needed for this type of construction is, of course, a pile driver. This is unquestionably a (C) type of equipment. Insofar as hours of use is concerned, its "usefulness" is low and expenditure for it doubtful; but construction without it was impossible, and funds for its purchase were not available. So our employees proceeded to modify a D-7 Caterpillar bulldozer so it could be used as a pile driver.

In addition to the pile driver, we have built or adapted other useful pieces of equipment, including: A 750-gallon power driven water sprinkling tank mounted on a 1940

D-30 International truck; a tool and power plant deck for alternate mounting on the same truck; and a power driven winch truck made from a 1938 D-35 International truck.

The above pieces of equipment were devised and built during non-busy periods by employees of the highway department at a minimum expenditure of funds.

The 750-gallon water sprinkling tank, operated with a 100 gpm pump, was originally a war surplus tank purchased from a farmer in the county at a cost of \$75. Inasmuch as this (B) type of equipment would be used only on a few occasions during the year, it was not deemed wise to mount it on its own chassis. The problem, therefore, was to evolve a scheme which would permit the tank to be dismounted from a chassis when not in use, and the chassis used for other purposes. Accordingly the pump for the sprinkler was mounted on the side of the chassis frame. The pump is driven by a long shaft from the power takeoff. Rubber hose is used on the suction and discharge side of the pump.

When the sprinkling tank is not needed it can be dismounted from the chassis. In its place, the department mounts its portable power plant and tool chest assembled on an independent deck which is in turn bolted to the permanent deck

of the same chassis as is used for the sprinkling tank. The portable power plant and tool chest outfit is used considerably in the construction of bridges. On this deck is mounted the war surplus 3000-watt Onan gasoline driven 115-volt portable power plant; an acetylene welding cutting torch; and a tool chest containing electric and hand tools. The cost of this very adaptable (B) and (C) piece of equipment was between \$600 and \$800.

Similar ingenuity has been shown by our highway employees in building other types of seasonable or special-use equipment. What cannot be bought we try to build. To quote one of the employees, who has put it a little differently, "What we cannot buy, beg, borrow, or steal, we build!"

Full-time employees of the county are as follows: A. Brink, G. Crocker, G. Fauke, D. Jacobs, H. Roettering, C. Rudolph, J. Shepherd, R. Shepherd, L. Johnson (Foreman), A. Dudley (Custodian), J. R. Moore (Engineer), B. Durbin (Secretary). Members of the Road and Bridge Committee are: V. O. DuComb (Chairman), J. Meyer and F. Straeter.

This is a brief description of the resourcefulness which a small county highway department used to solve the problem of being rich in equipment while being poor in resources.

analyses. If these are negative, the main is released for service; if positive, the disinfecting procedure is repeated as many times as may be necessary to obtain a satisfactory laboratory result.

One of the most important elements in the sanitary supervision of water quality is control of cross-connections. Under the Houston cross-connection control ordinance 2,124 cross-connection surveys have been made. Cross - connections were found in 380 instances; 373 of these have been eliminated and 6 are in process of elimination. A cross-connection, in its broadest sense is any piping arrangement that could allow water of an unknown or unsafe quality to become mixed with water in the city system. Such work is complicated and requires training and engineering skills. The survey of a single large industrial plant may require several days, since all sewer and water lines must be located and the possible interconnections determined.

Another routine control measure is the flushing of hydrants. This is done for several reasons. The water system has grown so rapidly and in so many directions that there are a large number of dead-end mains. Eventually, most of these will be connected into circuits, but meantime they are flushed regularly and frequently to assure that the water delivered to the consumers is satisfactory. Also, in a grid-type water system, there are certain areas known as "balance points" where no appreciable flow occurs in either direction, and these areas should be flushed. Finally, with a well supply, some sand is inevitably carried over into the mains, and this is kept at a minimum by flushing.

Later in 1950, the voters approved a water revenue bond issue of \$24,000,000 for the development of a surface supply to augment the existing ground water supply. The adopted plans for this new improvement include: A dam across the San Jacinto River near Sheldon which dam will be 63 ft. high and 8,000 ft. long and will impound about 160,000 acre-feet of water. A filtration plant will be constructed near Galena Park, which will have a normal capacity of 50 mgd and a maximum capacity of 80 mgd. The water will be carried from the dam to the filtration plant through some 15 miles of cement-lined canals. The total water available to Houston will be about 180 mgd, when the work is completed, of which 130 mgd will come from ground water sources.

## Sanitary Supervision OF THE Houston Water Supply

*These data are from a booklet "The Public Water Supply of Houston, Texas," which was forwarded to us by Clyde Harvill, Sanitary Engineer of the Department.*

**S**ANITARY supervision is perhaps the most difficult phase of a water system's operation to describe because it consists of the application of a series of preventive measures. In Houston, these measures include water treatment control, investigation of taste and odor complaints, cross-connection control, laboratory control, sanitary supervision over new construction, and similar procedures.

Sanitary control actually begins at the planning stage of any water supply, whether it is a new supply or an addition to the existing sup-

ply. Plans for any additions or improvements—wells, pumping plants, and portions of the distribution system—are reviewed to eliminate all sanitary defects before construction begins. Every inch of a new facility with which water will come in contact is disinfected before water may be used from it.

Fire hydrants and meters are washed with a strong solution of chlorine. The mains are disinfected, using essentially the following procedure: By means of a portable chlorinator, set up on the job, the main is completely filled with heavily chlorinated water and left for 24 hours. At the end of the 24-hour period, the main is flushed and refilled with water. Samples are then taken for bacteriological



## LEGAL AND ENGINEERING FACTORS IN WASTE TREATMENT

**T**HERE appear to be two basic theories as to the proper use of the dissolved oxygen in the water of our streams to aid in the treatment of our domestic and industrial wastes. One theory is that all of the oxygen above 4 ppm. can be used for oxidizing organic material; the other theory is that the oxygen should not be used unless it is unreasonable to provide expensive treatment facilities and any expenditure that is reasonable should be made to protect the stream.

The first theory is largely supported by the engineering profession and would appear to be a product of the profession itself. The late J. A. Childs, formerly Chief Engineer of the Twin Cities Metropolitan Drainage District, has been credited with the statement, "The object of sewage treatment is to render the sewage fit for disposal by dilution". This philosophy presumed that a municipality has the right to use natural waterways for the disposal of its waste organic material provided the extent is within reasonable limits, that is, that the dissolved oxygen is not depleted beyond the recognized minimum. Another consideration was that the quantity and condition of the waste had to be such as neither to interfere with public health and with fish life nor create a visual or odor nuisance. Consideration should be given to the possibility that this theory was partly a compromise with that of returning our streams to their original condition. Even at such an early date in our program

**RANDOLPH L. SMITH**, Consulting Engineer, St. Paul, Minn.

**HAROLD W. MOODY**, Municipal Attorney, St. Paul, Minn.

**HUGH C. LEIBEE**, Consulting Engineer, Minneapolis, Minn.

of pollution control a public sentiment was developing for clean streams and lakes.

In the actual functioning of the Childs theory there is a definite tendency toward the policy of first come, first served, with a stream's dissolved oxygen. The individual, municipality or industry farther down the stream does not receive fair consideration.

### For Clean Streams

It is not the belief of the writers that the general public is in agreement with the premise of the use of the dissolved oxygen above a certain point for most of the time, with the protection of the stream dependent upon political considerations during periods when the volume of water drops below the minimum design figure. After many years of thought and study of this problem, and discussions with individuals and municipal authorities, it is our firm belief that the general public is back of a program of restoration of our streams to a condition where they once again can become attractive in appearance and safe for all phases of recreation.

Because of the apparent re-occurrence of the idea of first come, first served, use of the dissolved

oxygen in the streams and the general bewilderment of the general public as to the functioning of the Childs theory, the authors have gone to the expense of having an unbiased legal study made of the legal decisions that affect the use of water in public streams. After careful investigation in order to obtain the services of an attorney that would be thorough, careful and with a sufficiently broad view point and experience to prepare a report that would point out the legal rights of the individual or community to the use of this stream water, we have selected Stephen Schmitt, St. Paul attorney, to make this study and report which is submitted herewith:

### Mr. Schmitt's Study

At your request, I have examined the law relating to water rights, particularly with respect to the rights of riparian proprietors in Minnesota; a summary of certain aspects of the law follows.

Water in its natural state, for example flowing in the bed of a stream, is real property.<sup>1</sup> A riparian proprietor is one who has land which includes a part of the bed of a stream or lake, or which borders on a public watercourse or lake, the bed of which is in public ownership. Land is riparian by virtue of the fact that it is so located in respect to a watercourse or lake that the possessor of it has lawful access to it for his private use.<sup>2</sup> The riparian proprietor does not own the water itself, but simply has the use of it while it passes.<sup>3</sup>

In Minnesota the law of riparian rights prevails; in many of the far western states, for example Utah<sup>4</sup> the doctrine of riparian rights does not prevail; there the doctrine of prior appropriation is applied.<sup>5</sup> This doctrine of prior appropriation will not be discussed further.

A riparian owner has certain rights as incident to the ownership of riparian land; among the most common of these rights are: the right to the flow of the stream in its natural course and its natural condition unimpaired in quality as well as quantity.<sup>6</sup> However, the right of the riparian owner to the water in its natural state may be affected by the reasonable use of the stream by other riparian proprietors.<sup>7</sup> The upper riparian proprietor is entitled to reasonable use and enjoyment of the stream, and it is incident to such enjoyment and use that the purity of the water will be impaired to some extent.<sup>8</sup>

### Limitations on Use of Water

The use of a stream and the water in it by a riparian proprietor is therefore limited by what is reasonable, having regard for the rights of other proprietors. In other words, each riparian proprietor has a right to expect that other riparian proprietors shall not make uses of the water which are unreasonable with respect to him. Prior occupation does not give one riparian owner priority over other riparian owners on the stream.<sup>9</sup> This entire doctrine of riparian rights and reasonable use applies to municipalities as well as to private individuals.<sup>10</sup>

As an example of the law of reasonable use, if the water of a stream is sufficient to supply the needs of both the upper and lower riparian proprietors for manufacturing purposes, neither has a right to use all of the water, but it is divided and used so that each shall bear his share of the loss caused by the shortage of water.<sup>11</sup> It is a corollary to what has been stated, that an upper riparian proprietor has no right to use or divert stream water in such a way as to destroy it or render it unavailable for the use of the lower riparian proprietor.<sup>12</sup>

As stated above, the fact that the use of a stream by a riparian proprietor may in some degree decrease the volume or affect the purity of the water does not necessarily render the use unreasonable or improper.<sup>13</sup> But when the use of a stream by the upper riparian pro-

prietor interferes with reasonable use by a lower owner, the burden is on the upper owner to show that his use is reasonable.<sup>14</sup>

What constitutes a reasonable use cannot be determined by reference to any sort of rule. What constitutes a reasonable use is a question of fact,<sup>15</sup> to be determined by the circumstances of the particular case.<sup>16</sup> As Judge Mitchell said many years ago in the Red River Roller Mills case:

"In determining what is a reasonable use, regard must be had to the subject-matter of the use; the occasion and manner of its application; the object, extent, necessity, and duration of the use; the nature and size of the stream; the kind of business to which it is subservient; the importance and necessity of the use claimed by one party, and the extent of the injury to the other party; the state of improvement of the country in regard to mills and machinery, and the use of water as a propelling power; the general and established usages of the country in similar cases; and all the other and ever-varying circumstances of each particular case bearing upon the question of the fitness and propriety of the use of the water under consideration."

Present case law on the subject of riparian rights concerns itself with pollution, interruption, and diversion of waters. However, the language of the many cases and other authorities read seems to indicate that the standard of reasonableness would also be applied by the courts in determining whether other types of use of stream water is proper.

Here again, no rule of thumb may be set down as a guide. Rather, in

each set of circumstances as it arises, the fact finding body must determine whether the use by one riparian owner which in some way affects the quality or quantity of the water in a stream by the time it reaches the lower owner, and affects his use, is reasonable. This may be an uncertain guide, but it seems to be the only one in Minnesota.

### The Authors Comment

Though these decisions do not give an absolute answer in a set formula, they do appear to point out that the property owner, whether an individual, a municipality or an industry has certain rights to the use of the water in a stream and should not be deprived of those rights. The dissolved oxygen is a natural constituent of the stream water; therefore from this study it appears obvious that the use of the water for the benefit of its dissolved oxygen becomes a legal use of the stream water, though this specific use may not have been mentioned in the law. In states where the law of riparian rights does not govern, it still appears to be the fairest solution to the problem.

The functioning of a method of pollution control based upon these decisions and the apparent opinions of the general public, must be that all possible treatment be provided that is reasonable as to cost. From the point of view of municipal wastes, this theory can only be met by intelligent use of the processes of treatment now available, but with more emphasis on the treatment of the liquids and an economy in treatment of solids by the use of vacuum filters, chemical treatment of sludge, etc.



<sup>1</sup>McCarter v. Hudson Water Co., 70 N. J. Eq. 695, 65 A 489, Affirmed in 209 U. S. 349, 28 S.Ct. 529.

<sup>2</sup>Restatement of The Law, Torts, #843.

<sup>3</sup>Pinney v. Luce, 44 Minn. 367, 46 N.W. 561. Harvey Realty Co. v. Borough of Wallingford, 111 Conn. 352, 150 A. 60.

<sup>4</sup>Beautiful City v. DeLuca, 27 Utah 107, 232 P. 104.

<sup>5</sup>Id.  
<sup>6</sup>See Greenwood v. Evergreen Mine Co., 220 Minn. 296, 19 N.W. 2d 726.

<sup>7</sup>Meriweather Sand & Gravel Co. v. State, 181 Ark. 216, 26 S.W. 2d 57.

<sup>8</sup>See Greenwood Case, Supra.

<sup>9</sup>Red River Roller Mills v. Wright,

30 Minn. 249, 15 N.W. 167.

<sup>10</sup>Atty. General Ex Rel Wyoming Twp. v. Grand Rapids, 175 Mich. 503, 141 N.W. 890.

<sup>11</sup>Watson v. New Milford, 72 Conn. 561, 45 A. 167.

<sup>12</sup>See City of Canton v. Shock, 66 Ohio St. 19, 63 N.E. 100.

<sup>13</sup>City of Elkhart v. Christana Hydraulics, 223 Ind. 242, 59 N.E. 2d 353.

<sup>14</sup>See Jones v. Conn, 39 Or. 30, 64 P. 855.

<sup>15</sup>Red River Roller Mills v. Wright, Supra.

<sup>16</sup>Cason v. Florida Power Co., 74 Fla. 1, 76 So. 535.

<sup>17</sup>Id.; Red River Roller Mills v. Wright, Supra.



# INTERNATIONAL AIR TERMINAL



## AT ISLA VERDE, PUERTO RICO

WITH commercial and tourist traffic becoming increasingly heavy at the Isla Grande airport in midtown San Juan, the Puerto Rico Transportation Authority has begun preliminary work on a new International Air Terminal at Isla Verde, 20 minutes outside the city. Construction of this modern airport and terminal, which will make Puerto Rico the air hub of the Caribbean, will take at least three years to complete at a cost of \$12,000,000.

Although present facilities at Isla Grande handle about 900 passenger planes and 30,000 passengers monthly, they are fast becoming inadequate to meet the growing volume of air traffic. One reason has been Puerto Rico's recent industrial expansion, which is bringing large groups of executive and operating personnel from the mainland. Another is the island's tourist promotion program which is expected to yield about \$15,000,000 to Puerto Rico this year. As the tourist program materializes, it will probably double the island's income from this source within the next ten years, and most of the visitors will arrive by air.

Improved passenger schedules between New York and San Juan, the introduction of newer equipment and the possibility that present schedules will be extended as licenses are granted to additional air lines will all complicate air traffic control at San Juan. The problem was foreseen by the Transportation Authority as early as



● AIR view of the new airport is shown at left above, and leveling and grading operations directly above.

1947 when the original plans for the Isla Verde air terminal were formulated. The Insular government, shortly after, pledged \$7,000,000 of its funds to complete the project, to be backed by a Federal grant of \$5,000,000.

The site of the new International Air Terminal borders the Atlantic Ocean just east of San Juan. A right of way has been acquired for the construction of a highway to the city which will be finished well in advance of the terminal itself.

At present a fleet of Euclid earthmovers is handling 2,000,000 yards of fill for the 482-acre airport site. Contractors have \$1,500,000 worth of heavy construction equipment on the scene to complete the job of filling, drainage and grading, after which work will be started on the

landing strips, ramps and other airport installations. Grading and leveling will be completed this year, raising the level of the land an average of eight feet.

Runways will be 8,000 feet long to permit handling the largest type of passenger planes at the rate of 40 to 50 per hour, or about 1,000 plane landings daily. The landing field is to be built of flexible pavement with 500-foot approaches, while the taxiways and aprons will be mostly of reinforced concrete. All buildings will follow a horseshoe pattern, with the administration building centrally located. In addition to the necessary passenger and freight buildings, plans call for residential quarters for CAA operating personnel.



● TWO million yards of fill are being handled by Euclids.

# CEMENT LINING CAST IRON AND STEEL FITTINGS



● **TOOLS:** Talmetto brush, wire brush, duster, trowel and can.

LIKE many other water purveyors in Southern California, the La Mesa, Lemon Grove & Spring Valley Irrigation District's supply contains quite aggressive waters. Not only do these waters contain from 130 to 340 parts per million total hardness, but because one of the District's major sources is from wells in the San Diego River, the water also contains iron consuming bacteria.

Unlined pipe and fittings of the system have experienced considerable corrosion and tuberculation due to the aggressiveness of the water. This has resulted in the shortening of the life of the pipelines, decrease in capacity of the mains and periodical discoloration of the water through services. In 1937 the District began the policy of purchasing and installing in the system cast iron pipe with a factory-applied cement lining. This policy is carried on today with very agreeable results.

The purchase of cast iron fittings cement lined by the supplier has been considered by the District in the past. By reason of cost and because local foundries were not set up to do cement lining, the District decided to continue to purchase fittings unlined and apply cement lining themselves. Since 1945 the District has cement lined all fittings placed in the system.

## M. J. SHELTON

General Manager and Chief Engineer  
La Mesa, Lemon Grove and Spring Valley  
Irrigation District

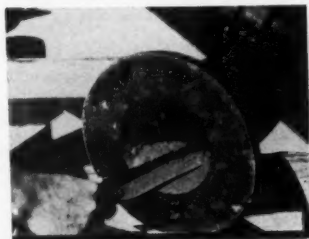


● **REMOVING rust and extraneous materials preparatory to lining.**

Lining of fittings by the District is done in the District's pipe yard by an employee whose job classification is that of storekeeper. As fittings are delivered, the storekeeper stock piles them on a platform adjacent to "the cement lining shed". According to the installation priorities for stock replacement requirements the fittings are lined. Fittings too large to be lifted by one or two men are moved with a Clark Loader purchased by the District from war surplus. The use of the loader has materially increased the ease and speed of handling awkward fittings, and decreased the occupational accident hazard in that phase of the District's operations.

Fittings are placed on a "lining table" or rack constructed for the purpose. The first step in cement lining is the preparation of the fittings by grinding off or wire brushing of the surfaces to be lined. This is done with a grinder mounted on a flexible shaft powered by an elec-

trical motor mounted on a movable dolly. The tools necessary for the actual lining are a small measuring container (the District has "standardized" on a one-pound coffee can), a mixing box or mortar board, a screen or sieve fine enough to remove pebbles, hard cement lumps and extraneous materials, a loam duster, a trowel, a #600 Talmetto brush, a molder's slick, and a wire brush. Cement which meets the requirements of the A.S.T.M. specification, Portland cement, serial designation C-9, of the latest revision, as it relates to type 1 and type 2, will be satisfactory for use in forming cement lining. White silica sand, passing 30 mesh (sieve), purchased by the District in 100 pound bags is used as aggregate. Cement mortar is mixed to a thick, soupy



● **METHOD of rough application of mortar with #166 loam duster.**

condition with sufficient stiffness to remain on the molder's slick without flowing off the end. As materials are used in such small amounts, the employee mixing the lining has had to learn by trial and error experience to determine satisfactory water, sand and cement ratio. When cement mortar is of the desired consistency, it is roughly applied to the bottom half of the fitting to be lined, and smoothed to a minimum over-all thickness of  $\frac{1}{8}$  inch. As soon as the mortar has gained sufficient adhering stiffness to remain against the wall of the fitting, the

fittings is turned over and the lining is applied to the other half circle. Inspection is made to assure that no areas lined have less than  $\frac{3}{8}$  inch thickness, nor more than  $\frac{1}{4}$  inch thickness. Before the cement has completely set up, a Talmetto brush, slightly wetted, is applied around the full circle of the lining to the extent that it creates a smooth, uniform finish. Inspection is again made to assure that all desired surfaces are properly lined. The fitting is then removed from the "lining" rack and placed in a shaded location with dampened burlap bags covering the openings. Fittings may be left in this condition from 4 to 36 hours. At present, and since 1945, the District is painting the interior cement lining with Inertol Standard. This paint is used, not only to fill surface voids and pores, but also as a curative agent for the green cement lining. With the application of the Inertol Standard it is no longer necessary to cover fittings with burlap, and they may be removed to the stock pile for curing.

#### **Curing Prevents Taste and Odor Development**

On occasion the District has attempted to install fittings within 24 hours after the application of the Inertol Standard paint. Such a procedure has resulted in the creation



● **SURFACE of lining is smoothed by using the #600 Talmetto brush.**

of offensive taste and odor conditions in the lines in which the fittings are installed for several weeks after the line is put into operation. It is recommended that all fittings be allowed to cure a minimum of 10 days to allow the volatiles in the Inertol Standard paint to evaporate. The District is quite satisfied with the Inertol Standard, but it is contemplated in the future, when the present supply is depleted, that the District will purchase "Amercoat" from the American Pipe & Concrete Company. This paint has similar de-



● **AFTER cement lining, fittings are stored 10 days or more to allow volatiles to evaporate and prevent tastes in the water.**

sired characteristics, and is satisfactory for immediate installation within 12 hours of application.

When lining large castings, 24 inches in diameter and greater, it is best to let the bottom half of the roughly applied lining set up for approximately one-half hour before turning over as the linings are heavier and may pull off if turned over too soon. In this case the lining may be smoothed and brushed before turning the casting over, and the whole job is done with turning the casting only once.

As the District salvages many valves and fittings in its pipeline

clean-up and renewal of used fittings. All of these fittings salvaged and to be renewed will be cement lined before again installed any place in the system.

#### **Costs**

It has been the District's experience that the cost of lining fittings is in the magnitude of 5 to 8% of the purchase price of the fitting. The District has broken down in percentages the cost ratio of cement lining, as follows: Material, 10% to 15%; labor, 75% to 80%; and overhead, 10%.

Under the District's present program of installation, averaging 6,000 lineal feet of pipe per month, the District's storekeeper assigned to the yard is generally able to line all fittings, in addition to carrying on other duties about the yard.

It is the District's belief that the cement lining of fittings and specials is a prerequisite to long life and good service of pipelines. We are satisfied, at present, that the process of lining can be done most economically with the District's own forces, with the added desirable feature of simplified quality control of workmanship.

The District welcomes inspection of its procedures and any suggestions or recommendations toward improvement.



● **VIEW of final step, applying the Inertol standard paint coat.**

enlargement and replacement program, it is a convenient and economical operation to combine the jobs of lining new pipe and the

# SOLVING THE SEWER

**RALPH L. COULDRON**

Street Commissioner, Jenkintown, Pa.

JENKINTOWN is probably representative of thousands of other small communities throughout the country in many ways. Picture an area of approximately one-half square mile, a population of over five thousand residents; and thirteen and four-tenths miles of hard surfaced streets, all serviced with a well built sanitary sewer system. Being a small community and unable to support individual departmental crews for various types of duties, our Highway Department labor crew is confronted with all the necessary work of refuse removal and disposal, street repairs, street cleaning, snow control, inlet and storm sewer maintenance, and sanitary sewer maintenance. To make matters worse, 1943, when I became Street Commissioner, was the period of war emergency gasoline, tire and material rationing; depleted labor crews; and short tempers. Yet all usual services were expected to be rendered as usual.

That winter, we were plagued with sewer stoppages, almost always due to tree roots. In a few cases, stoppages were so bad as to cause backing up through lower fixtures in basements, creating a bad situation for residents and officials alike. I would like to mention here, that most of our residential streets are lined with trees, planted along the grass plots between curb and sidewalk. (Here is a constant source of trouble, not only to sewer lines, but also to the curbs, sidewalks, street lighting efficiency and removal of fallen leaves). Trees can be beautiful, but not to a street commissioner, at least in such a location.

## Getting Back to the Sewer Problem

To get back to the sewer problem, it seemed that stoppages of an emergency nature always occurred on Saturdays, Sundays, holidays or at night, or at any time when the men were busy doing other important work, or were not easily available. This meant much incon-



venience to all, and extra cost for overtime labor. I checked with our foreman, an able man of many years of local experience, and to my surprise found that no routine checks of the sewer system had ever been made. It was the common practice that sewer pipes, either sanitary or storm, after being buried in the ground, were forgotten, as all other pipes are, until they become stopped up and require immediate attention. What, it was felt, could happen to a pipe buried anywhere from six to twenty feet underground? We found that plenty could happen, had happened, and was now happening.

Here we were, faced with the fact that a sewer system installed in 1926 was now seventeen years old, with many potential stoppages building up in locations where no checks had ever been made to avoid them. The following spring, during our curtailed refuse collection period, which had been cut from weekly to bi-weekly during the war emergency, we used the intervening weeks to concentrate on sewer checking and cleaning. Some of our sewer lines were really forgotten, to the extent that the employees did not know where some of them were located. I dug out all of our available engineering plans, which were very precise and detailed, and with the foreman began to trace all lines, locate manholes, and attempt a block by block systematic check. We had to resort to magnetic dip needles, tape measures, etc., to locate lost manholes which had been covered by street, parking lot and driveway surfacings. Every foot of the approximately thirteen miles of sanitary sewer system was probed by the end of the second summer.

## Recording and Cleaning

A file card index was started and maintained during this period. Each card contained the information for one or more blocks of every street, driveway or right of way; date checked, length from block to block, whether or not roots were found, and the degree of same, from light to very heavy. In addition, a small map was marked with symbols at each point where a root stoppage was located. These symbols also indicated the degree of root growth.

Some of the articles removed from the sewer lines were astonishing, to say the least—tools, stones, broken terra cotta, small toys, rags, etc., which were introduced accidentally or during making of connections or repairs, and then became hung up on root obstructions. We even removed 12 sections of old wood rods which had been lost during a cleaning job some seven years previous, and had washed down the lines, the men having been unable to locate them.

After this complete cleaning, which we completed during the summer of 1945, we periodically checked, when time was available, the known trouble spots at least twice a year, or more often, according to the last known degree of root growth. Each file card was accordingly noted as to date and degree for future reference. It is most convenient, when a plumber is called for a private stoppage, and insists that the stoppage must be in the main street line, that your file card will show the section had been checked only a few weeks or a couple of months previous, and had been found or put into good condition.

We do not attempt lateral cleaning. The roots entering laterals result in almost all cases from trees over which the property owner has jurisdiction, or is otherwise responsible.

We could not have done this work so satisfactorily without the proper equipment. We were already in possession of about 300 feet of Flexible steel sewer rod, with reel, guide pipes, augers and ratchet turning handles; but as I mentioned, it had been used only when a call for help came. With root growths such as we encountered in some places, it seemed that nothing short



# CLEANING PROBLEM

of digging up, breaking the pipe, cleaning out, patching the pipe (in most cases very unsatisfactory) and again refilling and resurfacing the ditch, would suffice; and all with the terrific expense and inconvenience involved in such an operation. The old wood rods were not nearly equal to the job, as has been mentioned before.

## No Streets Dug Up

I am pleased to state, however, that we did not dig up *any* street. The steel rod saved us this headache. Furthermore, it was a rare occasion for a man even to climb down a manhole, let alone work in it. It was unnecessary, as the guide pipe can locate the sewer pipe even in a full manhole.

We did find, however, that the hand operated ratchet turning handles built up a very strong spring tension when the rod was inserted to great lengths into a heavy growth. A slip of the hand then meant possible accident or injury to the operators. The power-driven rod turning machine answered this problem. This power unit saved its own cost on the first job. We removed a section of willow roots totalling 14 feet in length, in three pieces, from an 8-inch pipe buried 11 feet underground, without digging. The root mass was so solid that it was difficult for a man to compress it by trampling it with his feet. For the past five years, it has not been necessary for me to call out a crew for a sewer emergency caused by root stoppage after our regular hours. We know where our trouble spots are and check them regularly; the remaining sections are inspected occasionally during lull periods, and if we strike trouble, we have the tools to do the job quickly and conveniently, with a fair file record of new trouble locations.

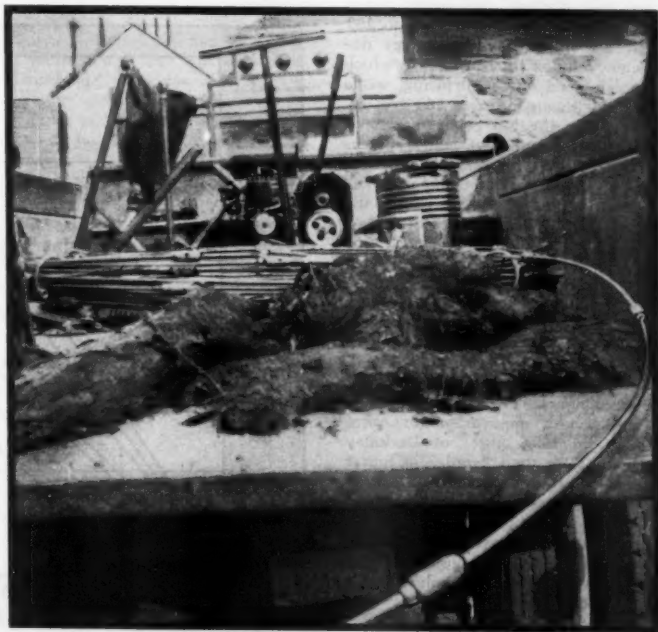
For reasons of traffic or pedestrian safety, we use a minimum of five men on a difficult or long section cleaning, as the rod is usually left made up and withdrawn without reeling, if the next section is to be cleaned. Two men for pushing the rod at the manhole, one man operating the power drive, and two men handling the revolving uninserted rod to prevent whipping on street or sidewalk. Of course con-

ditions will control the number of men used, but safety is a large factor in public operations.

The rod is always worked downstream with the sewage flow, in all types of stoppages. This we learned the hard way. We tried to work against the flow in a root stoppage which had backed up a 10-foot deep manhole to the street level. When the root plug broke loose, it acted like a piston in the 8-inch line, with the hydraulic pressure of tons of water forcing root plug, auger and rod downstream. The rod twisted and whipped out and up into the air. Fortunately no one was injured, but the pressure of sewage backed up into a lateral, and into the basement of dwellings. This gave us an additional cleaning job to take care of, which we had not counted on. Thus we learned to work with the flow, even in a full manhole, break the obstruction, let the sewage flow off gradually, and then open the line completely.

We have never broken or lost a

steel rod section, to date, although we have managed to bend a few, during our preliminary struggles with what we thought were immovable stoppages. On the whole, replacements have been negligible, and occasional checking and oiling of the sections and joints practically eliminate this type of breakdown. We do add, from time to time, rod sections or accessories to build up our equipment, which at present consists of approximately 450 feet of Flexible 5/16-inch steel city type rod (3-foot lengths) coupled and carried on rod reel and stand; rod guide (sectional pipe and bend); cork screws; augers and brushes, from 2-inch to 10 inch; ratchet turning handles for hand turning; and last, but not least, the Flexible power drive unit which is gasoline powered. The drive unit is used only when an obstruction is stubborn, or manhole distances are very long. Unless root growth is heavy, the rod can usually be pushed by hand from manhole to manhole.



● **WILLOW** roots 12 to 14 ft. long was removed from an 8-inch sanitary sewer line. The roots were removed in sections, without digging, by using the equipment shown mounted on the truck.

# A RATING METHOD FOR STREET RESURFACING

*This is an abstract of a paper before the Second California Institute on Street and Highway Problems. The authors of this paper were Ralph A. Moyer, Research Engineer of the Institute of Transportation and Traffic Engineering, Berkeley; Richard Gallagher, Director of Public Works of Berkeley, Calif.; and John W. Shupe, Research Assistant of the Institute.*

THE factor of need for resurfacing was established for all streets of Berkeley by measuring the surface roughness with a modified Bureau of Public Roads road-roughness indicator; and by applying a factor for traffic volume. The values obtained in the road-roughness measurements and in the traffic counts are combined to give one factor which has been designated as the surface deficiency index, with values ranging from 0 to 100. Streets which have a surface deficiency index of 9 are those which do not need any resurfacing, while those with an index of 100 are obviously in the top priority.

On rural highways and freeways where speeds are of the order of 40 to 60 mph, the commonly accepted values of the roughness index in inches per mile are: Below 100, excellent; 100 to 150, good; 150 to 200, fair; and above 200, rough. On secondary city streets where speeds do not exceed 35 mph, these values may be increased, and in the Berkeley study were as follows: Below 125, excellent; 125 to 200, good; 200 to 300, fair; 300 to 450, rough; and above 450 very rough.

Roughness measurements were taken on 199.6 miles of Berkeley streets. Less than 2 miles of major streets (out of a total of 35 miles) had roughness values exceeding 300 ins. per mile; but 52% of the secondary street mileage had roughness values exceeding 300 ins. per mile; in fact some of this mileage exceeded 400 ins. per mile.

## Traffic in Small Residential Areas

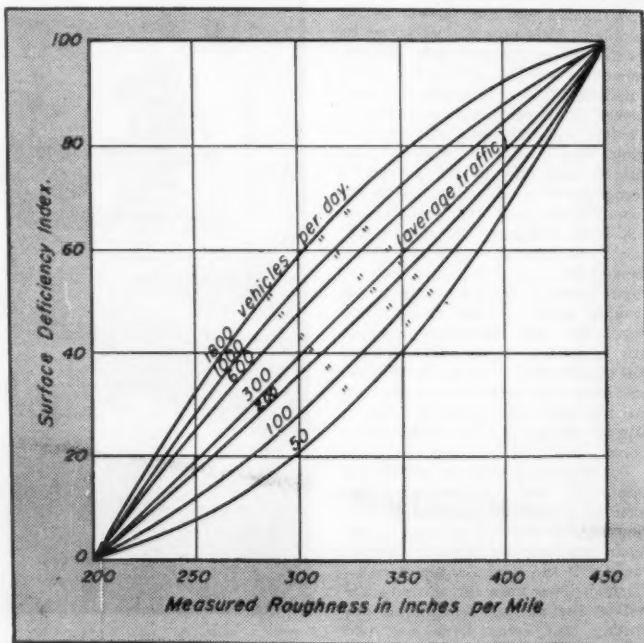
A special study was made to determine the average number of

trips per day to and from residential areas. Three areas were selected which had no convenient access except through the traffic count station. In one area with 480 dwellings, there were 6.4 trips per day per dwelling; in another area having 430 dwellings, there were 6.0 trips per day per dwelling; and in a third larger area, with 1,100 dwellings,

the average was 6.2. It is believed that these figures may be slightly high because there are no neighborhood shopping centers in or near any of the three areas studied. There are, therefore, likely to be more outside trips by the residents of the areas and delivery trips to the residents than in some other places.

## The Surface Deficiency Index

After studying the roughness measurements, an upper limit of roughness of 450 ins. per mile was established, and any street with this or higher roughness value received top priority regardless of traffic volume. Also, a lower limit of 200 ins. per mile was established so that surfaces with lower roughness values were not considered for resurfacing. In adjusting the roughness measurements for various traffic volumes, a formula was developed which followed the same general form as that developed by Karl Moskovitz for the Arizona State Highway Department. This is shown graphically herewith, as is the method of rating by roughness measurements. It will be noted that for a street having a roughness of 350 ins. per mile, the surface deficiency index is 40 for a



● SURFACE-deficiency-index values for the secondary streets of Berkeley, based on roughness measurements and traffic volumes.

traffic volume of 50 vehicles per day, but is 78 for 1,800 vehicles per day. This chart does not consider streets having a roughness of less than 200 ins. per mile. Since these were considered satisfactory.

It is likely that this rating method will be modified to allow for certain special factors or conditions,

including (1) abnormally high repair costs prior to resurfacing; (2) projected programs for installing new utilities, as gas or water lines; (3) the need for sealing a surface that is badly cracked but has a low roughness value; and (4) the need for applying a non-skid treatment to a slippery street.

tersections, plus service station and other driveways. Consistency is the absence of abrupt surprises, such as sharp concealed curves and narrow bridges.

### Service Factors

Service to the road user is the dispatch and ease with which a given trip can be made. Factors constituting service include alignment (12 points), passing opportunity (8 points), surface width (5 points), sway in cross-section (5 points), and roughness of texture (5 points).

Alignment is based on comparison with standards of design. A road designed for 50 mph in a mountainous area, carrying less than 1,000 vehicles per day, rates 12 points; but the same road in a desert area where design speed is 70 mph rates only 9 points. Passing opportunity is a function of congestion of the roadway and locations where passing is feasible. In regard to width, each foot under the standard width causes a reduction of 1 point. Sway in cross-section refers to heaves in subgrade, irregularities in cross-section, or to any condition that requires constantly a tight grip on the steering wheel. Roughness in texture takes into account such factors as corrugations, irregular bridge decks and rough surfaces.

### Adjustment for Traffic

After a road section is rated, an adjustment is applied to give greater priority to heavily traveled roads. This adjustment is made in proportion to the amount of deviation from the average traffic volume on the system. For example, if the average traffic volume on the system is 1,300 vehicles per day, a road with a rating of 60 points and an average daily volume of traffic of 1,300 is rated at 60 points; if this road carries only 300 vehicles per day, the rating will be 70 points; and if it carries 5,000 vehicles per day, the rating will be 50 points. This relation is based on a logarithmic adjustment of traffic volume rating.

The system is not completely infallible, but it is estimated that about 95% of all roadway sections will appear in the proper place on the list and that only 5% will require special consideration in planning improvements and programming funds.

**See also, Mathematical Rating for State Highways, PW, Nov. 1946.**

## NUMERICAL RATINGS OF COUNTY HIGHWAYS

*Adapted from a paper by William E. Willey, Engineer of Economics and Statistics, Arizona State Highway Department, before the Second California Institute on Street and Highway Problems.*

**N**UMERICAL rating of county highways has permitted a sound planning and programming of highway improvements; and at the same time provides a method of determining if the highway system is being improved, and how fast. In doing this, each section of highway is assigned a certain number of points depending on its actual present condition as determined in the field. A perfect road, carrying such amount of traffic that vehicular movement is safe and without congestion, rates 100 points. These points are divided into three major categories, as follows:

Condition .....	35 points
Safety .....	30 points
Service .....	35 points

This breakdown avoids such engineering phraseology as alignment, profile, grade and sight distance, though all of these are given weight.

The condition of the road is considered to be a composite of structural adequacy (17 points), anticipated remaining life (13 points) and maintenance economy (5 points). Structural adequacy ratings are made on the basis of excellent (16-17 points), good (12-15 points), fair (8-11 points) or poor (0-8 points). Anticipated life is based on experiences with similar road types, with one point given for each year of expected life remaining up to 13

points, actual present age being the determining factor. For instance, a bituminous road is rated on a total 15-year life; a modern concrete road on a 25-year life. Maintenance economy is based on maintenance expenditures greater or less than average. In general, roads with a high maintenance cost will have a poor subgrade and a low structural adequacy rating; therefore, maintenance is, in effect, assigned as much as 22 points out of a total of 100.

### Safety Factors

Safety, with a total of 30 points, is subdivided into roadway width or marginal friction (8 points), surface width or medial friction (7 points), sight distance or intersectional friction (10 points), and consistency (5 points).

Roadway widths are compared to standard widths for the class of road as determined by traffic volume and terrain. For instance, a 28-ft. road where 28 ft. is the standard width for a traffic volume of 50 to 300 vehicles per day, is rated 8 points. However, if the standard is 40 ft., based on a traffic volume of 1,000 to 3,000 vehicles per day, the rating is 2 points out of the possible 8 points. Marginal friction is the resistance caused by parked cars or other obstructions at the edge of the roadway. Medial friction is the resistance caused by traffic flowing in opposite directions along an undivided highway. Intersectional friction is caused by normal street in-

# DALLAS SPENDS MILLIONS FOR WATER WORKS IMPROVEMENTS

DALLAS, Texas, one of the fastest growing cities in the southwest, will have to spend some \$29,000,000 over the next three years in order for the water department to keep pace with the rapid increase in population. Supplying of enough water to meet the demands for domestic and industrial consumption has for years been one of Dallas' biggest problems. Each time that a new improvement program has been completed, the population growth has quickly made it necessary to start another expansion program. Time and time again, this has been repeated. Today, the city has a filtration capacity of 100,000,000 gallons. Plans recently have been completed for a new water plant nine miles north of Dallas which will add another 96,000,000 gallons daily treatment capacity. This plant is estimated to cost \$5,800,000; contracts for new work have already been let totaling \$5,000,000 for plant construction and more than \$2,000,000 for new supply lines.

Water authorities here estimated that, by 1970, the daily demand will be up to 270,000,000 gallons per day. The over-all improvements for the system in the years 1949 to 1952 are estimated to cost \$29,000,000. These will be financed from the sale of general obligation bonds. People who live in Dallas know that water is the greatest asset that the city can have and that, without ample supplies of water, commerce and industry cannot survive, and future growth is stifled.

The city has entered into an agree-



Photos by L. B. Adams

● **MONO-CAST enameled 42-in. bell and spigot cast iron pipe is stored along a street awaiting installation. Ditching machine and crane for handling pipe are shown in the background.**

ment with the Federal Government for the storage of water in two new lakes which are now under construction. These new sources of supply will be connected with all sections of the present system.

Recently, the city has installed a new feeder main from the Bachman Treatment Plant. This large feeder main ties in with all of the existing intersecting cross mains in its course from the plant to the center of the city.

The following footage of cast iron pipe was involved in this feeder main and in other large feeders over the city:

42-in.	7,390 Feet
36-in.	13,680 Feet
30-in.	27,552 Feet
24-in.	41,504 Feet

20-in. .... 8,960 Feet

16-in. .... 7,200 Feet

**Total 106,186 Feet**

This represents nearly twenty-one miles of additional feeder main for carrying water to the consumers.

All of the joints in these mains were made with neat cement. This type of joint has been adopted by the Dallas water department and is used for laying all new water mains. The cement joint has given exceptional service at very low cost.

Charles Ford is City Manager; Karl Hoeftle is Superintendent, and John Winder is Chief Engineer of the Water Department. The large Bachman feeder main construction was carried on by joint contractors, Cole Williams, Inc. and W. G. Cullum and Company, both of Dallas.



● **STORAGE yard at railroad siding for Dallas pipe.**



● **BIG pipe is lowered into trench.**



# HOW ENGINEERS CAN APPLY FOR COMMISSIONS

THE Army, the Navy, the Air Force and the Public Health Service have unofficially informed the Editor of PUBLIC WORKS that commissions can be granted to engineers in accordance with certain conditions. Primarily this is being done to conserve the younger engineers. Most of the men who have been graduated from engineering schools within the past four or five years are in the present draft age limits. If these engineers are inducted as enlisted men, it will be exceedingly difficult not to lose permanently their skills; then, if a major emergency should arise, it will be necessary to rely almost wholly on the engineers who were available in 1941—and these men are now ten years older.

The Editor talked with personnel officers of the above services in Washington during the week of Jan. 8, and requested adequately detailed information covering the procedures and requirements for the Corps of Engineers and the Medical Service Corps of the Army; the Navy; the Air Force; and the Public Health Service. The data received from these various services are published in this article. If additional information is received later, it will be published as soon as possible.

## General Information

Though the data apply primarily to the younger engineers, it is believed that they are broad enough to cover any engineer within certain lower age brackets; and also some other professions. A governing factor is the need for the various skills and the number of position vacancies in which they can be applied. In the Public Health Service, the funds available for commissioned officers govern the number that may be appointed.

The procedures herein cannot be utilized to avoid military service (or active service in the Public Health Service). Unless a request for immediate EAD (extended active duty) accompanies the application for a commission, there is exceed-

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ingly small chance that the commission will be granted. The reason for this is explained below. This applies especially to younger men.

Applications for commissions in the Army (Corps of Engineers or Medical Service Corps) must be made to the Commanding General of the Army in whose area the applicant lives. The addresses of the various Armies are:

- 1st: Governors Island, N. Y.
- 2nd: Baltimore, Md.
- 3rd: Fort McPherson, Ga.
- 4th: Chicago, Ill.
- 5th: San Antonio, Tex.
- 6th: San Francisco, Calif.

There are Military Area headquarters in many large cities, and personal visits to these may be advantageous. Refer to the telephone books and note what offices are available, including the Navy and the Air Force. Applications to or requests for information from the Public Health Service should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C.

A suitable degree is believed necessary in all cases. This must be in engineering for engineers, etc. The applicant must also be physically and morally acceptable. Engineering experience is desirable and valuable, but probably not essential.

The applicant should do as much as he can locally before writing to any of the names given in this article or to the Editor of PUBLIC WORKS. There will be a few personnel officers who may be unfamiliar with the procedures outlined. This article may be presented to them; and, in the final analyses, recourse may be had to Washington. It would be wise to obtain the assistance of local leading engineers.

## Army Medical Service Corps

The following information has been furnished by Lt. Col. R. J.

Karpen, MSC, Preventive Medicine Division, Office of the Surgeon General, Department of the Army, Washington 25, D. C.

To be eligible for a commission in the Medical Service Corps Reserve, as a sanitary engineer, the applicant must possess a degree in civil, chemical or sanitary engineering from an accredited institution and be otherwise physically and morally acceptable. If he is currently a civilian, he must complete the standard forms and forward them to the Commanding General of the Army concerned along with a request for extended active duty. The form covering extended active duty should be submitted concurrently with the application for commission, since the number of Reserve commissions available in a particular Army are based on T/O&E and TD vacancies. Hence, with the limited number of such vacancies, an applicant may be turned down. However, if he submits the request for extended active duty, the file is sent to this office and if we have vacancies in any other Army (which is usually the case), we recommend to the Army, in which application is made, to commission the man.

Following the submission of the application along with the report of the physical examination and other related papers, the applicant will be called upon to meet a board of officers for a personal interview. After the evaluation of all of these records, a recommendation is made to the Adjutant General of the Army area regarding the granting of a commission to a particular individual.

If an individual is on duty as an enlisted man, he may apply in a similar manner. However, the request must be submitted through command channels, beginning with the unit to which he is assigned at the time he makes application.

For commissions in the Medical Service Corps, reference should be made to Special Regulations 140-105-6, which all personnel officers will have available.

### The Navy

Applications are being accepted for appointment to commissioned grade in the U. S. Naval Reserve. In addition to the data given here, information can be obtained from Navy Recruiting Stations or the Offices of Naval Procurement. The material herewith was forwarded by Commander Eugene Rider, Administration Branch, Recruiting Division, Bureau of Naval Personnel, Department of the Navy, Washington 25, D. C.

Positions for which engineers may apply are listed hereafter. A college degree is necessary in all cases. Age limits are given.

**Civil Engineer Corps**—Not over 33 years old; experience required, some of which may be covered by graduate study, except that experience is not required for commission as ensign. In addition to a scientific degree in engineering, a Navy Standard Score on the OQT of 55 for civilians and 50 for veterans is required.

**Naval Intelligence**—Not over 33; college degree required; open to certain types of engineers; foreign language knowledge essential.

**Naval Architecture**—Not over 33; must be graduate of MIT, Webb Institute or Michigan with degree in Naval Architecture.

**Supply Corps**—This application must be accompanied by request for immediate active duty. Age not over 26; draft classification must be 1-A, or eligible for such classification. OQT score minimum 55.

**Navy Recruiting Stations and Offices of Naval Officer Procurement** are located in: Boston, Chicago, Cincinnati, Dallas, Denver, Detroit, Kansas City (Mo.), Los Angeles, Macon (Ga.), Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, San Francisco, Seattle and Washington, D. C.

### Air Force Medical Service Corps

The same procedure for obtaining a commission in the Air Force Medical Service Corps applies to engineers who are recent graduates in engineering with no previous military experience, or with previous enlisted service; and to men who have had ROTC training but do not have a commission.

The applicant should write a letter to the Surgeon General, U. S. Air Force, Washington 25, D. C., Attention: Medical Liaison and Selection Branch, and request a set of application forms. He will be furnished these forms and complete

directions as to the procedures to follow. When the application is received, it is reviewed by the Environmental Sanitation Branch for professional qualifications; by the Physical Standards Branch for physical fitness; and administratively to insure that the application is complete. If the application is accompanied by a request for extended active duty, all necessary action is accomplished by the Air Force Headquarters. Applications for commissions without EAD are handled by the appropriate numbered Air Force.

In all cases where a letter is addressed, as directed above, to Air Force HQ, complete information is furnished the applicant.

The procedure for obtaining a commission in the Medical Service Corps in specialties other than engineering is basically the same. The number of commissions to be granted depends entirely on current needs. At present, the greatest need exists in the field of bacteriology.

This information was furnished to us by Major Jack C. Carmichael, Chief, Environmental Sanitation Branch, Preventive Medicine Division, Office of the Air Surgeon, Dep't. of the Air Force, Washington 25, D. C.

### Corps of Engineers of the Army

Engineers, 21 or older, holding a degree, may apply for a commission in the Corps of Engineers directly under the provisions of 140-105-1 unless they have had previous enlisted or Warrant Officer experience, in which case, 140-105-3 will apply. Application may also be made under 140-105-8. In any case, if the applicant expects to have favorable action taken, he must attach to his application a request for extended active duty. ROTC graduates not now having a commission apply under 140-105.

Applications for commissions may be made at any time—before a draft call, after a draft notice has been received, or after induction. In the latter case, application must be made through command channels. Action on the application may not be possible until after basic training has been completed as a draftee, but the status of a man has no effect upon processing his application. A man who has been inducted may also apply for Officer Candidate School, but there is no assurance that, if successful, he would be assigned to the Engineers when commissioned.

These data were furnished by Lt. Col. R. J. Harvey, Personnel & Administration, Office of the Chief of Engineers, Department of the Army, Washington 25, D. C.

### U. S. Public Health Service

At this time, information is not available as to the professional requirements for commissioning in the Public Health Service. Some commissions in this service may be granted. Applications must be made to the Surgeon General, U. S. Public Health Service, Washington 25, D. C., as previously stated.

### Sanitary Engineers for Civilian Overseas Assignments

Sanitary engineers are needed to direct and coordinate a sanitation program in Japan. A degree and at least five years of specialized experience in sanitation are essentials. The salary is \$6400 plus living quarters; minimum tour of duty is two years; transportation to and from Japan is at Government expense. Application should be made to Recruitment Section, Overseas Affairs Branch, Civilian Personnel Division, Office of the Secretary of the Army, Dep't. of the Army, Washington 25, D. C.

## on-the-job EQUIPMENT designed by County Engineers

**H**AVE you devised any special equipment that has helped in your work, and if so, what was it? This was one of the questions on PUBLIC WORKS' recent County Engineering Report, from which about 650 returns were received. Replies to this particular question exceeded expectation and show clearly how much thought and professional background are being utilized

in county engineering work to-day. Here are some of the replies:

We have fixed up a 50-gallon emulsion sprayer that we can set in a 1-ton pickup truck for scattered patching work. E. R. Hanna, Road Commissioner, San Benito County, Calif.

An attachment has been worked out for our loader bucket so that (Please turn to page 68)



## SEASONAL CONDITIONING FOR YOUR SWIMMING POOL

**J. A. OLDENBURG**

Palmer Filter Equipment Co., Erie, Pa.

**I**N many pools throughout our country there is a more or less constant check and countercheck to ascertain the proper condition of the pool water and of the equipment used to insure the proper quality of recirculated water. However careful this constant check may be, there is a period extending from the beginning of May until the middle of June when every pool operator begins to scratch his head to see what can be done to prepare his pool for the really heavy season ahead.

Since the easiest part to consider is the pool itself, whether it is being used or not, the first consideration is to determine if this is in any need of repair. Are there any cracks needing repair? Are inlets and drains adequate and in proper condition? Is pool cleaning equipment now required; or if on hand, does it require replacements? These are all surface conditions upon which decisions can be reached with a minimum of effort.

### Checking your Pool

Now we come to the condition of the pool water, either under present operating conditions, or as reports show it at the end of the last current period of operation, or at the time of the state or city inspector's last report. If these are all satisfactory the job of continuing the operation of the pool or returning it to normal operation is relatively simple. But there are certain points in regard to the equipment which require careful periodic checks. These checks should be made in private pools to determine if the equipment will safeguard the health

of you and your friends. In public pools it is mandatory.

If pools are not of the recirculating type, a check should be made to assure that there is no possibility of back siphonage into the source of the city or town supply during any periods of low pressure. Admission of pool water to water lines cannot be permitted. Safety can be assured by the installation of an elevated surge tank or an inlet line double check valve.

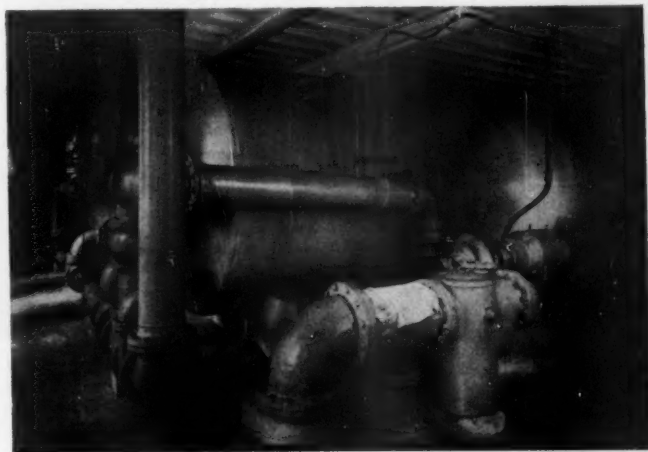
The second point to check in non-recirculating pools is the capacity of the inlet and outlet lines to insure they are free of all obstructions and deposits, and will allow proper pool turnover. If your pool is not subject to inspection, you can easily obtain a copy of pool regulations by writing your State Board of Health.

The third point that should be carefully checked is the chlorinating equipment. This is subject to

corrosion if left inactive for a period of time. If corroded it may not only give incorrect operation when returned to service, but can also be a definite source of danger due to leaks. Write the manufacturer for a check of this equipment.

Outside of chlorination there is usually no other form of treatment applied to non-recirculating pools. Bromine and iodine are sometimes added but are not as yet the common practice. If bromine is used, handling equipment should be checked to avoid the possibility of severe burns resulting from the contact of the undiluted bromine; and iodine solutions should be checked to assure proper sterilization.

All facilities for pre-pool entry such as lockers and foot trays should be inspected to assure that all are available and in condition for the season. Shower heads and



● **FILTERS** are usually out of sight but proper maintenance is nevertheless essential. This article tells what to do and how.

hot and cold water connections should be checked for safe operation. This also involves inspection of the hot water heating unit. All of these may seem to be extremely routine to the average operator but the very fact that they are routine makes them all the more easily overlooked, until the omission is called to your attention in an emergency.

### **Recirculating Pools**

Up until now we have dealt with the relatively simple type of non-circulating pool widely used in small pool installations where quantity of water is not a particular factor or where cost does not enter the picture. However, in large pools the cost of water may become prohibitive and recirculating equipment must be utilized. The use of this equipment adds to the factors which must either be periodically checked or carefully inspected before pools are returned to operation after a period of inactivity.

All of the foregoing checks referred to in connection with non-circulating pools apply to the recirculating type and in addition, there are other items requiring much more detailed attention.

First and foremost it must be kept in mind that a pool of the recirculating type is necessarily such because of the load demands made upon it. Secondly, being such a type it is more than likely subject to inspection by municipal or state authorities. Third, due to the aforementioned conditions it must be run according to definite standards and regulations arrived at through careful observation of health officials responsible for the welfare of the public.

Very often these regulations impose certain duties and expenses upon institutions responsible for pool operation. Although often not anticipated, this condition should be expected and planned for in advance whenever possible. The mere fact that a pool is available in a neighborhood where none existed before is an open invitation to both children and adults, not only in the immediate neighborhood, but within any reasonable reach of modern transportation.

This means that modern pool facilities cannot be based upon an anticipated 50, 100 or 200 per day occupancy alone but must rather be set up and operated first, to care for an estimated over demand; and second, to meet the regulations applying to the specific size of pool

decided upon. Once the size of pool is definitely decided upon, and proper equipment chosen for the operation of such a pool, the capacity per hour of operation must be governed accordingly.

### **Increasing Pool Capacities**

Bather capacity per pool can be increased within reasonable limits by the addition of larger recirculating pumps; additional filters, and increased facilities for adding alum and chlorine. First of all, be certain that the added chemicals can be properly applied so as to avoid carryover to the pool. After-precipitation of alum for example, in the pool is more often the cause of cloudy water rather than incorrect or insufficient recirculation. Severe skin irritations may be the result of incorrect application of chemicals.

Pool designers can render a distinct service to the public by taking into consideration the possible future demands on a pool, and providing space for additional equipment. This adds little to the initial cost and may save a very considerable expense at some later date. No pool installation is ever large enough to meet future demands. In time to come additional pools will have to be built, but it is a good idea to have interim expansion facilities available.

The previous paragraphs will probably seem to many to be an unnecessary interruption in an article supposedly devoted to the seasonal conditioning of swimming pools. However in the past few years the conditions mentioned have been called to the author's attention so often that it is apparent that they should be emphasized.

To get back to the periodic check or reconditioning of a recirculating pool, the various phases will be taken in the order of their importance.

### **Pumps and Motors**

Beginning with the heart of the recirculatory system the pump and pump motor are the first items requiring careful attention. Motor bearings should be checked for both lateral and vertical wear. Bearing wear is a condition which accelerates rapidly and can result in a motor short and complete cessation of operation with at least a 24-hour shut-down even if repair facilities are available locally. Out of town repairs can mean a pool shut-down of a week or more.

Brushes and commutator should

be checked for excessive arcing. If the motor has been out of use during seasonal shut-down, try cleaning the commutator with fine sand paper (68-80 grit). Do not use emery cloth because the extremely hard abrasive grains will set in the copper, or in the mica dividing strips, and will quickly ruin the brushes. The silica grains of sand will crush and wear away rapidly without arcing and will therefore not cause as much brush damage.

If the commutator shows unevenness indicating wear, the rotor should be removed and the commutator turned down on a lathe to assure concentricity between bearings and commutator surface. Upon reassembly be sure that oil or grease connections are free and that the motor is properly lubricated before returning to service.

Check the pump for impeller end play. If excessive it will strike the pump housing, causing rapid wear and loss of efficiency. Side play, as in the motor, will multiply rapidly and soon result in complete shut-down. If recirculation seems to be reduced, either gauge the suction and pressure sides yourself with the proper gauges or have your local pump representative or master plumber do this for you. It may be necessary to adjust the impeller for less clearance to avoid excessive slippage between the outer impeller face and the pump housing. Check the mounting bolts for tightness and packing and lubrication facilities before returning to service.

In many installations water heaters are located near the pumps. These should be inspected in regard to scale or deposits, by breaking necessary connections to allow internal observation. Scale formations or deposits will greatly lower the efficiency of the unit. Applications of dilute acid or alkaline solutions, as the case may be, will remove these in a short time. Usually heated cleaning solutions work much more rapidly than do those of cold or normal temperatures. Be sure that disconnect, by-pass or shut-off valves are clean, tight, and in condition to operate freely at all times if occasion demands.

Check all line connections and fittings for leaks. Valves, elbows and reducing fittings should be inspected for partial stoppages, or deposits. Comparatively new installations (1 to 5 years old) seldom show any deposits. In installations 10 to 12 years old there may be a pressure drop of 4 to 5 pounds in the system with a corresponding reduction in

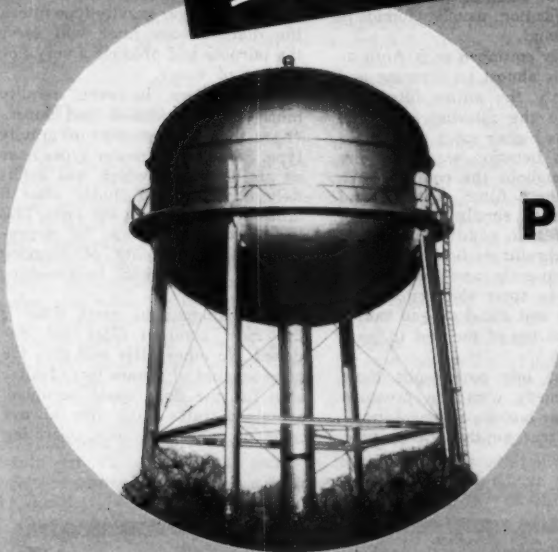


WHERE

*Appearance*

COMBINES WITH

*Economy*



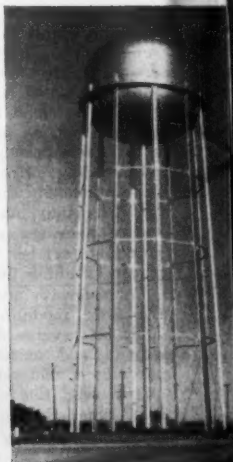
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recirculation, due to restrictions caused by minerals naturally present in the water or to coagulant. If alum is the cause, the restriction will be found somewhere between the alum pot feeder and the filters, usually in the influent valve, or where the pipe is reduced from the main supply line between the pump and the individual filters.

### Checking the Filters

We now come to what is usually the most neglected portion of the entire pool system. Since most pools utilize pressure filters of either the vertical or horizontal type, the too general procedure is to operate them year in and year out without inspection. This is, of course, incorrect but after all it is usually quite a job to remove the manhole covers and inspect the filter medium. Added to this is the fact that all too often the observer can tell very little about the actual condition even after making a routine visual check.

Actually this check-up should be made at the end of the season so as to allow time for replacement of filter medium, or to effect any necessary repairs to the underdrain or collection system. In all cases the filters should always be thoroughly backwashed and drained at the end of the season when advantage can be taken of the large supply of pool water available before the pool is drained.

Pressure filters, although compact and simple to operate, have in general, an inherent weakness in design which limits the amount of backwash which can be effectively supplied to clean the filter. This is no reflection on any type of pressure filter because generally all filters using silica or quartz sand have practically the same peculiarity. Changing over to Anthrafil seems to be the only sure way of attaining correct expansion and proper cleaning during backwash.

To backwash and clean properly the filter medium there must be sufficient reverse flow of water to expand and agitate properly the particles of material. With silica or quartz sand this means roughly 4 to 6 times the normal filter rate. Anthrafil weighing only about one-half as much as sand requires a backwash flow only 2 to 3 times that of the normal filter rate to create the same percentage of expansion.

Anthrafil has the additional advantage of considerably longer filter runs which is of definite interest to operators of pools where bather load

is heavy over extended periods of operation. This is possible because of the fact that the minor differences in the specific gravity between the particles of Anthrafil eliminate the stratification usually found in ordinary sand.

In a filter equipped with Anthrafil there is almost no layering and consequently the entire filter bed enters into the filtering operation. This means higher rates and longer filter runs between washes. Many pools throughout the country have doubled their filter capacity and pool operation simply by changing to Anthrafil. In addition the shape of the Anthrafil particle is angular and consequently any hair or lint will tend to enter the bed only a few inches and stand on end rather than lay on top of the bed to form a mat.

The past few paragraphs have dealt primarily with the pressure type of filter but the same information holds true for the gravity type

the use of diatomaceous earth filters. In many cases they serve a very definite purpose. Where space limitations do not allow the installation of the larger pressure filter units, or the still larger gravity type filters, the diatomaceous filter will serve the purpose and produce a very fine quality of water.

These filters, however, require much closer attention and supervision than the pressure or gravity type. Some of the newer types have an air blowdown which will definitely eliminate the sludge after it is broken away from the cells. This is a distinct advantage for it precludes the possibility of plugging up the drain when backwashing the unit.

The diatomaceous earth filter is the most compact filter yet designed. No other filter will give the same amount of square feet of filter area for the floor space occupied. Sustained rates may not always come up to expectations, operating



● **BUSY days at a pool require all equipment to be in top-level condition. This New York pool has a wading pool in the rear.**

of pool filter. The one difference is that gravity filters generally are equipped with adequate underdrain systems capable of supplying ample backwash to the filter. Whether or not the backwash supply is ample for correct washing of the sand bed, changing to Anthrafil will give the added advantage of higher rates and longer filter runs. Many southern outdoor pools which have open type, all weather filters have changed to the use of Anthrafil for this reason.

Since the end of the war a large number of pools have converted to

costs may be higher than for other types of filters, and more time be devoted to their functional care, but for pools with limited space for either initial equipment, or for added equipment, these filters will definitely come into increasing use.

Being cognizant of the increasing popularity of the above mentioned type of filter and at the request of many pool operators and industrial users of this type of equipment, there is at the present time being conducted a series of tests to determine the possibility of using powdered Anthrafil in this type of

filter. Preliminary tests indicate the feasibility of continuing the study and in fact have already proved that this material many be superior in many ways to diatomaceous earth. Further word will be given on this as the experiments progress.

#### Where to get answers to your questions

In this paper, we have not endeavored to bring out the technical side of pool operation. What we have tried to do is point out some of the most commonly overlooked phases of operation so as to make the general functioning of your pool easier and safer for its occupants. If, as many others have done, you run into a particular problem that you cannot solve, either contact the manufacturer of your filters or write to the author of this article. I cannot guarantee to answer all of your questions but I will certainly put you in touch with someone who can answer the ones which I cannot.

Always keep in mind that you owe it to yourself and the patrons of your pool, whether it be private or public, to see that all of your

equipment is operating correctly at all times. Don't check everything and put the pool into operation and then forget about it. Correct and safe operation means constant checking of the points which I have mentioned in the foregoing paragraphs. Always keep in mind that water-borne diseases are some of the worst with which we have to contend. Only continual care will avoid the possibility of an outbreak which may ultimately be traced to your pool. If you yourself do not understand the possible dangers of incorrect operation you can well imagine how little the general public realizes whether or not your pool is safe to enter. It is your responsibility, and only you will be held responsible if anything happens. The old safety slogan of "always be careful" might well be modified into pool language to read, "always be checking". You may think that your state health department is supposed to take care of this, but it is too late for recriminations when you have trouble on your hands. After all their staff of inspectors can only complete their circuit every so often. In between, cooperate with them and be your own inspector.

#### Maintenance Procedures For Comminutors and Screens

Two papers were read on the operation of screenings-removal equipment at a 1949 meeting of the Indiana Sewage Works Ass'n. One, by D. P. Backmeyer, Supt. of Water and Sewage at Marion, Ind., dealt with the two comminutors in that plant, each of 5 mgd design capacity. In the other, W. E. Ross, City Engineer of Richmond, Ind., discussed bar screens.

After describing the maintenance methods employed in maintaining Marion's comminutors, M. Backmeyer said: "Comminutors require maintenance but, because of the cleanliness of the method of screening utilized, it is believed that they constitute a practical piece of essential equipment for the Marion plant. Attention to cutting parts and their maintenance before they are badly worn is important. When small pumps are to be protected the comminutor will do a better screening job than the bar screen, and gives added protection to the pumping unit."

Mr. Ross said: "Like all other

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With Anthrafil filter runs are demonstrably doubled. Only about half as much wash water is required. There is less coating, caking, or balling with mud, lime, iron, or manganese.

Also better removal of bacteria, micro-organic matter, tastes, and odors.

Filters using Anthrafil are out of service for briefer periods due to shorter wash cycles. Not just the top portion but the entire bed aids in filtering.

Anthrafil can be used in all types of filters using a filter media. Increased filter output with better quality effluent is assured. And, in addition, Anthrafil is a perfect supporting media for synthetic resins and for industrial and alkaline solutions.

### Swimming Pool Filters

With construction of new pools now restricted, you will need to get full capacity operation of your existing pools. An important and economical way to do this is to change now from sand or quartz filter media to Anthrafil.

This will give you longer filter runs—often twice as long—with only half the wash water. Again, with Anthrafil you will get correct expansion and proper cleaning during back wash, a better removal of bacteria and odors. Anthrafil helps, too, in removing fibrous material in pool filters.

In brief, for clean, sparkling, healthful water in your pools switch to Anthrafil. Now is the time to plan to better next season's pool operations—with Anthrafil.

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mechanical equipment, mechanically cleaned screens should have periodic inspection. They will operate much more efficiently when the chains are adjusted to the proper tightness and are well greased. The rakes should be aligned and the stops set for the proper operation. The kick-off plate on the rakes should also be checked to see that it has the proper clearance at all times. The grinder should be kept greased and the knives changed as often as necessary to keep a cutting edge on them. This

will eliminate excessive wear on the rotor bearings and hammer rods.

"There is little doubt that screens are cheaper to maintain, and perhaps to operate, but they are not as free of messy appearance as is the comminutor. . . . There are places where it would be foolish to install screens instead of comminutors, and there are also places where screens are the only solution to the problem. Each case must be studied before a decision is made, with all the factors being given due consideration."

## STREET PAVEMENT DESIGN AND CONSTRUCTION

W. L. CHILCOTE

Deputy Highways Engineer  
Bureau of Highways, Baltimore, Md.

*This is a portion of a paper presented by Mr. Chilcote at the American Road Builders' Association 1950 meeting.*

FOR main arterial highways, concrete pavements are constructed to a depth of 9", using 3500# concrete with a 6.5 cement factor. Air entraining cement is used throughout. Mesh reinforcement is not generally required. These surfaces are constructed on a well prepared and compacted sub-base, under-drained and stabilized with at least 6" of selected pervious materials. These highways are constructed in lanes ranging from 10' to 12' wide, with contraction joints approximately 30 feet apart, of the reinforced load transfer type. Load transfer expansion joints are placed 150 to 300 feet apart, at intersections, and otherwise to suit any local condition. After completion, these joints are sealed with a hot poured bituminous crack sealer. The curbs are poured monolithically with the roadway slabs. The pavement surfaces are finished to a tolerance of  $\frac{1}{4}$ " in 10'. The final pavement is given a broom finish and cured with curing compounds. This type pavement costs approximately \$8.50 per square yard, complete in place.

Concrete highway pavements constructed in the residential areas and in places other than main traffic arteries are 7" thick, using 3000# concrete with a 6.0 bag cement factor. Air entraining cement is used throughout. While the base is well compacted and otherwise prepared, no sub-grade stabilizing or

underdrains are used except in unusual conditions or circumstances. Dummy type contraction joints are cut through  $\frac{1}{3}$  the depth of the slab at intervals of approximately 25 feet, but no load transfer reinforcement is used. Load transfer expansion joints are placed at 150' to 200' intervals with joints also at street intersections. No wire mesh reinforcement is required. Otherwise these highways in the residential areas are constructed similar to main arterial highways and under the same specification requirements. This type of pavement costs approximately \$6.00 per square yard, complete in place.

### Bituminous Macadam Pavements (Flexible Type)

Where conditions so warrant, a flexible type bituminous macadam pavement is used. This type pavement is constructed in three stages, to a total depth of 9": 4" of water bound macadam base, 3" of penetration macadam and a 2" compacted thickness surface course of hot-plant-mix bituminous concrete.

Generally this type pavement is constructed with combination concrete curb and gutter on either side.

The first stage water bound macadam acts as a stabilizing factor, preventing surface water infiltration; the penetration macadam seals the roadway; and the final course of hot-plant-mix bituminous concrete gives an impervious surface and provides a smooth permanent paving. This type of pavement costs approximately \$5.50 per square yard, complete in place.

### Sheet Asphalt Surfacing

Sheet asphalt surfacing is constructed in two courses, to an aver-

age total depth of 2". The first course consists of 1" asphaltic concrete binder; the second, 1" sheet asphalt surface course. Before a roadway is surfaced it is swept clean and given a tack-coat of asphalt emulsion, 0.15 gallon per square yard, using a mechanical spray. Directly following this operation the surface is covered with hot-plant-mix bituminous concrete binder, placed with paving machines, at temperatures ranging from 275°F. to 350°F., to a depth of 1" compacted. The binder course is composed of graded aggregate, maximum size  $\frac{3}{4}$ ", washed concrete sand, and from 4% to 6% of 70-85 penetration asphalt cement. After the binder course has cooled, a surface course of hot-plant-mix asphalt topping, with temperatures ranging from 275°F. to 350°F., is placed with paving machines, to a depth of approximately 1" compacted, and rolled with 12-ton rollers. The sheet asphalt surface course is composed of specially graded asphalt sand, mineral filler, and from 10.3% to 11.3% of 70-85 penetration asphalt cement. A surface tolerance of not more than  $\frac{1}{4}$ " in any 10' is permitted. No mineral flour or other material is used on this finished surface. The dull, smooth, black surface of the bituminous pavement is the finished product.

### Bituminous Concrete Surfacing

On secondary concrete roads and macadam roadways, a hot-plant-mix bituminous concrete surfacing is used. This material is placed to a total depth of approximately 2" compacted, and is laid in either one or two courses. It is composed of stone aggregate, washed concrete sand, and from 5.5% to 8% of 85-100 penetration asphalt cement. The maximum gradation of the stone aggregate is  $\frac{3}{4}$ ", and the maximum gradation for the washed concrete sand is  $\frac{3}{8}$ ". These materials are placed with a paving machine similar to that required for sheet asphalt pavements.

### Sand Asphalt Surfacing

Sand asphalt surfacing is quite like the sheet asphalt surfacing, except that a washed concrete sand is used in the surface course in lieu of the specially graded asphalt sand. The binder course is the same. The surface course consists of a washed concrete sand, maximum gradation  $\frac{3}{8}$ ", approximately 12% of the mineral filler by weight passing the 200-mesh sieve, and from 7.50% to 8.10% of 70-85 penetration asphalt cement to the total weight of com-



# CINCINNATI IS WHIPPING THE HIGH COST OF BULK RUBBISH COLLECTION

Man-hours required for big tonnage collection cut 60 percent.

The City of Cincinnati gives Eight Reasons Why the Dempster-Dumpster System cuts bulk trash and rubbish collection costs and cuts work time from 2.43 man-hours to .98 man-hours per ton of material delivered to incinerator.

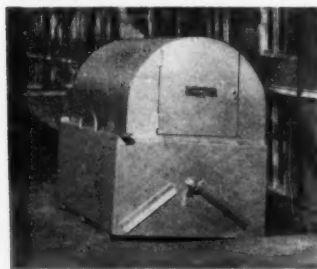
Recently a large Southwestern city, investigating the Dempster-Dumpster System of trash and rubbish collection, requested information from the City of Cincinnati on results obtained with the Dempster-Dumpster System. Here is the reply they received from Mr. Ralph C. Taylor, Superintendent of the Waste Collection Division, Department of Public Works.

"The City of Cincinnati Waste Collection Division has been using the Dempster-Dumpster System to augment its regular collection set up since 1948. Our experience since that time indicates that this system, utilizing the principal of large containers which can be left at rubbish accumulation points and easily picked up and carried to disposal point by a Dempster-Dumpster pick-up unit operated by the driver, is highly desirable. Our records indicate that the operation of these units require .98 man-hours per ton delivered to the incinerator as compared to 2.43 man-hours per ton needed in the operation of conventional pick-up with dump truck and crew.

"I have listed below some of the advantages of the Dempster-Dumpster System as we see them.

"1—These large heavy duty containers can be placed on the ground or in specially designed pits if so desired at the point of accumulation and loaded directly by the recipients of the service rather than placing the waste in some intermediate container. This eliminates rehandling by the collection forces in loading into standard collection units, a costly process.

"2—These containers offer a low loading height, making their application easy to any given situation.



AN APARTMENT TYPE detachable Dempster-Dumpster Container is shown above at accumulation point.



ONLY ONE MAN, THE DRIVER, is required in the Dempster-Dumpster System of municipal trash and rubbish collection. Driver is shown above attaching lifting chains to a drop bottom container. He will return to cab and from hydraulic controls hoist pre-loaded container into carrying position and drive to disposal area where materials will be dumped automatically.

"3—This system eliminates the idle time of trucks standing while loading at these points of large accumulations and eliminates lost labor time waiting for the trucks to return after its trip to the disposal area.

"4—The containers are of rugged construction and are practically indestructible. We feel that one of these containers over a period of time will cost less to buy and maintain than the refuse cans it replaces.

"5—Where necessary, leakproof containers may be used, eliminating the spillage of noisome wastes and the resulting unsanitary conditions.

"6—The rat nuisance is practically eliminated with this type of container and we have several outstanding examples where remarkable cleanups were made.

"7—Litter around the loading station is practically eliminated by the use of these containers. This is in outstanding contrast to stations using a great number of the conventional trash cans where the handling of lids and cans by the users usually results in overloading and improper covering.

"8—These detachable containers lend themselves readily to clean dumping at the disposal point. They can also be kept clean and sanitary with greater facility than the small container.

"At the present time in Cincinnati the Waste Collection Division is using these containers for both combustible and non-combustible wastes at the following type of institutions where large quantities of wastes are produced: Schools, Railroad Passenger Terminal (garbage from dining cars), Railroad Produce Terminal, Hospitals, Large Apartment Developments, Social Benefit Functions and Feasts, Circuses and Fairs."

Cities and towns everywhere are installing the Dempster-Dumpster System because no other method of bulk rubbish handling by truck can match the Dempster-Dumpster System in low cost of operation, efficiency, sanitation and good housekeeping! For a cleaner city and a lower budget, it will pay you to investigate the Dempster-Dumpster System. Write today for complete information. A product of Dempster Brothers, Inc.



DEMPSTER-DUMPSTER Container with drop bottom dumping action is shown above as it begins to open hydraulically and discharge trash and rubbish.

## DEMPSTER DUMPSTER

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bined aggregates. The exact percentage of bitumen will vary with the gradation of the aggregates. Otherwise this pavement is placed similar to the sheet asphalt type. Its appearance is good, but the texture of the pavement is not so smooth as sheet asphalt.

#### Bituminous Surface Treatment

This type of surface treatment consists of leveling up the existing roadway, filling in cracks and giving the entire surface a seal coat of bituminous material, either asphalt cut-back, asphalt emulsion or

tar at the rate of  $\frac{1}{2}$  gallon per square yard of roadway surfaced, using a pressure distributor. After this a crushed stone aggregate, gradation #4, is spread over the existing pavement with mechanical spreaders at the rate of 25# per square yard of the area treated. This surface is broom dragged to a uniform consistency and rolled with a 10-ton roller. The cost is approximately \$0.10 per square yard, complete in place.

The sand seal surface treatment consists of spreading a pre-coated sand aggregate uniformly over the

existing bituminous pavement. Before this treatment is placed the surface is cleaned and given a tack coat of asphalt emulsion (AE-6), applied with a pressure distributor, mechanically operated at the rate of 0.20 gallon per square yard. After the entire area has been treated with a bituminous tack coat, including the cracks and other open places in the pavement, a sand aggregate, usually washed concrete sand, maximum gradation  $\frac{3}{8}$ ", is applied at the rate of 24# per square yard of treated area. This sand, before placing, is pre-coated with 4% of asphalt cutback (RC-2), and heated to a temperature of approximately 220° F. The material is spread uniformly, broom dragged and then rolled with a 10-ton roller. The cost is approximately \$0.15 per square yard, complete in place.

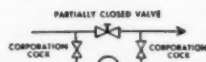
#### Other Data

Preventive methods consist principally of sealing cracks with hot poured asphalt crack and joint filler. The cracks and joints are thoroughly cleaned before they are sealed and extreme care is taken to make sure the cracks are impervious to water. This crack-sealing is used on both concrete and bituminous pavements.

Utility cuts are repaired by the city. A deposit is required at the time the permit is obtained, based on the size and type of pavement disturbed. The minimum charge is \$20 for each and every opening made in the public highway. A 9" minimum cutback in the existing pavement is required for bearing on the old sub-base.

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tricity or other outside power was required. A residual of 1 ppm as measured with O. T. was established in the mains and gave an actual residual of 2.3 ppm Cl and ClO<sub>2</sub> — without noticeable taste or odor. After 10 days, tests proved the sterilization complete, and the treatment was discontinued.

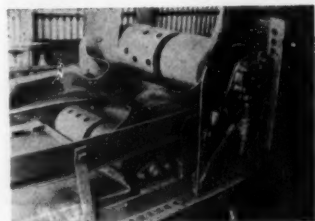
**TODAY, in peace or war, pure water is a "must"! Every water works needs this emergency sterilization equipment. %Proportioneers% Chlorine Dioxide System is the ideal unit . . . it's complete, ready for instant use: to sterilize new mains, to eliminate contamination, to meet the emergencies of war. Investigate now, while equipment is still available. Write for bulletins.**

%Proportioneers, Inc. 356 Harris Ave., Providence 1, Rhode Island.

## Ditcher Remodeled for Highway Clearance

M. J. Shelton

**T**HE La Mesa, Lemon Grove and Spring Valley Irrigation District has recently remodeled the conveyor belt units on its two Buckeye trenching machines so that the overall width of the machines does not

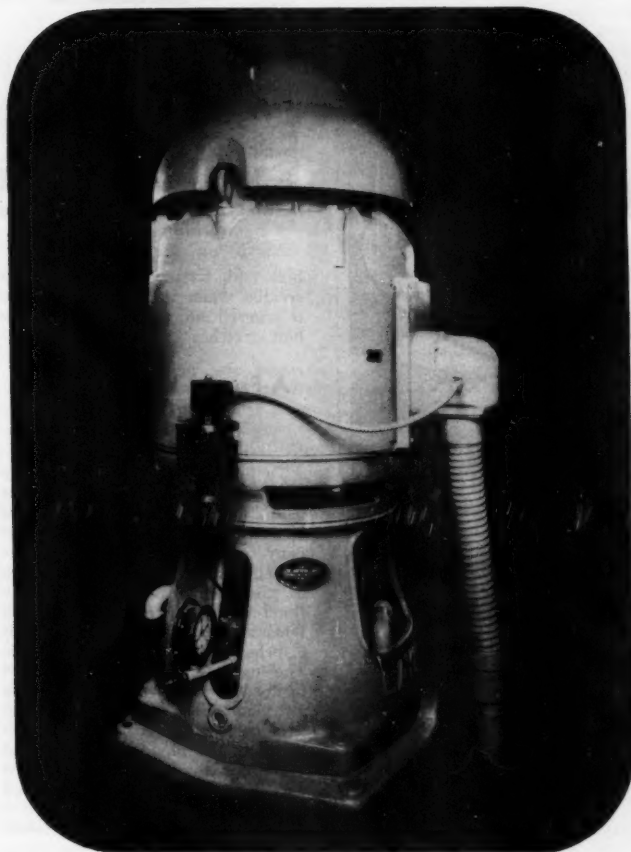


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## NEW IDEAS IN MUNICIPAL ENGINEERING

### Details of Precast Concrete Catchbasin

Richard H. Ward

Engineering Assistant  
Turlock, Calif.

THE catchbasin or street inlet shown in the accompanying illustration was made up by a local pipe company. We are very well pleased with the Irving type "V" grating used for the top. It is lighter and stronger than the conventional cast iron grate. We have installed 30 of these catchbasins. They were connected to the domestic and industrial sewer with an average length of 30 ft. of 6-inch pipe. The average cost of the 30 installations, complete, including the cost of all material, grating excavation and backfilling was \$62.50 each.

Specifications of the catchbasins are: Aggregate  $1\frac{1}{2}$ -inch maximum; six sacks of cement per cu. yd., 2-inch maximum slump, with forms vibrated for maximum density. Reinforcement is as shown, with the tops of vertical bars welded to the grate frame and all horizontal rings joints welded. Grate is  $18\frac{1}{2}$  by 22 ins. of Irving subway grating, loading capacity to meet California maximum vehicle load (H-20). This type of grate is used because of its superior strength, ease of removal (weight is 50 pounds), and resistance to clogging. Frame is  $2\frac{1}{2}$  by  $3\frac{1}{2}$ -inch angle. Pipe outlets fit 6-inch pipe. The top of the outlet is 11 ins. below the top of the grate; outlet locations can be placed anywhere. The bottom of the catchbasin is open, so that it can be placed on fresh, stiff concrete, on solid soil or on crushed rock.



• Waukesha's hydraulic crane.

### Waukesha Water Utility Uses Mobile Crane

The Water Utility at Waukesha, Wis., is better able to handle the endless variety of jobs for which it is responsible by using a truck-mounted hydraulic crane, according to Assistant Manager Joseph Kuranz. The crane is used for digging manholes, replacing main line valves, handling fire hydrants, unloading reinforcing rods from cars, setting derrick sections for pulling pump and well pipe, lifting out pump motors, and the many more jobs that come up from day to day.

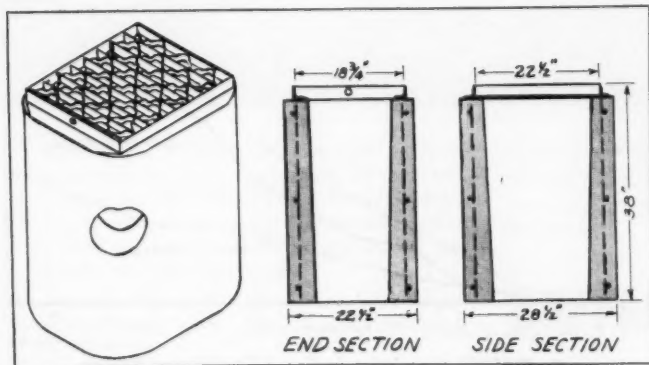
Excavating for leaks in mains or hydrants with this crane avoids hand digging in wet ground and is faster than hand labor. The truck crane is used also for putting in new services—usually when the ditch to be dug is not over 25 ft. in length.

Ultimately all of the old concrete pipe that has been in use throughout the city will be replaced with cast-iron pipe. Although part of this work will be contracted out, the water utility is handling the re-

placement at intersections with the new crane. The machine can be maneuvered easily to avoid congesting traffic, and finishing up intersections in advance will mean that they will not need to be blocked off completely later when larger equipment finishes the pipe replacement job.

### Sewer and Water Extension Policies

Winston-Salem, North Carolina, has adopted new policies for the ex-time service is required, will invest an amount equal to the cost of a 40-foot extension of 8-inch sewer line tension of sanitary sewer and water lines within the city. Individuals may contract with the city under a "single connection" plan or a "group connection" plan may be used by several homeowners living in the same vicinity. The sewer extension policy provides that the city, at the for each user to be served, or a cash investment of \$60 for each user, whichever is the smaller amount. The city will also provide funds for street crossings, manholes, and related structures. Under the single connection plan an applicant desiring sewer service must pay all costs beyond the first 40 feet of sewer main or an investment of \$60 on the part of the city, with no refund involved. Under the group connection plan, applicants are required to deposit cash equal to the total cost of the extension including rights-of-way, but excepting street crossings, manholes, and related structures. Refunds are made to the group at the rate of \$60 per connection each year for the first five years after the line has been installed, but the city will not refund an amount greater than the original deposit. The water main extension policy is substantially the same except that the city will invest up to \$175 for each new connection to serve a single family or business unit. Under the group connection plan for water line extensions the applicants have a choice between receiving a refund from the city of \$175 for each connection made during the first five years or a refund of an amount equal to 10 times the water revenue billed during the year to property directly connected to the extension. These refunds can be made only for five years and the city will not refund an amount greater than the original deposit. Public Management.



• AT left, details of precast concrete catch basin.

# PUBLIC WORKS

# DIGESTS

**T**HIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

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## THE WATER WORKS DIGEST

### Use of an A. C. Calculator In Distribution System Design

The conventional method of solving hydraulic distribution system problems has involved the use of methods of successive approximations, such as the Hardy Cross system. The authors have developed a method whereby an alternating-current network calculator (of which there are more than 22 in operation and commercially available) can be employed to arrive at a solution with only one setting and a correction factor, to produce results accurate within 5% of total flow in the network. Their method applies a correction factor to the linear reading of the A. C. network calculator relation between voltage and current, because the relationship between the analogous water pressure and pipe resistance is not a linear one.

M. V. Suryaprakasam, George W. Reid and J. C. Geyer—"Use of Alternating-Current Network Calculator in Distribution System Design," *Journal, American Water Works Ass'n*, December.

### Fluoridation of Public Water Supplies

More than 40 municipalities of the United States are adding fluorides to their drinking water to reduce tooth decay. Grand Rapids, Mich., which began applying fluorides in January, 1945, has found a reduction of incidence of caries in children up to 7 yrs. of age of more than 50%; and other cities where fluoridation of water supplies was not begun until later have reported reductions of 20% to 40%. It is believed that, for the north-central

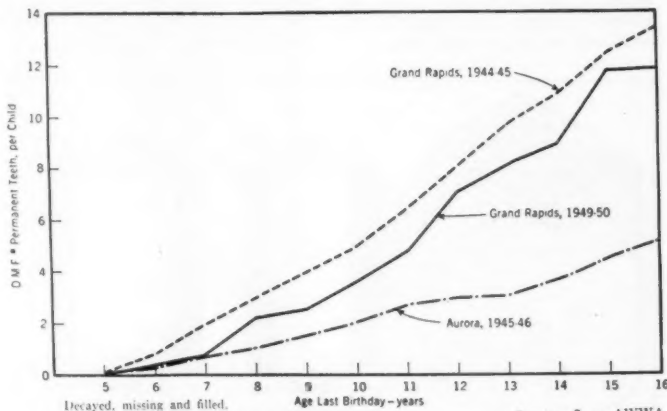
area of the United States, a fluoride concentration of 1.0 ppm is the optimum; for southern areas it may be less—perhaps as little as 0.5 for some localities. Many waters contain more or less fluoride, and the amount to be applied artificially is that needed to increase the concentration to the optimum.

There are several compounds of fluoride that can be used for this purpose. Commercial forms of sodium silicofluoride contains 60% fluoride; hydrofluoric acid, 57%; calcium fluoride, 47.7%; sodium fluoride, 42.5% to 44.4%; hydrofluosilicic acid, 23.7%. The acid fluorides, although more expensive, can be fed directly by means of solution feeders in which Monel metal or hard rubber are used to resist their extreme corrosiveness. Balancing cost against convenience of handling, sodium silicofluoride

and sodium fluoride appear at present to be the most promising sources of fluoride. They can be purchased in 100-lb. bags, 375-lb. fibre drums and 425-lb. barrels.

The silicofluoride can be dissolved in large solution tanks and fed through solution feeders, or it can be fed as a slurry. The solid fluorides can be fed by dry feeders, but solution feeders are generally used for the smaller supplies—less than about 2 mgd of water treated. For very large supplies, gravimetric feeders are recommended. The mechanics of feeding fluorides (except hydrofluoric acid) are no more involved than those for other chemicals used in water treatment.

Some other water treatment processes tend to remove fluorides; for example, 10 ppm of alum, when added to water with 1.0 ppm fluoride, will remove about 0.1 ppm



● **CARIES experience in Grand Rapids and Aurora.**

Courtesy Jour. AWWA

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of the fluoride. So it is advisable to add fluoride after the alum treatment. If settling is efficient, so that the filters have to remove relatively little material, fluorides can be added before filtration; but if the filters receive a considerable load, the fluorides should be added after filtration.

If reasonable care is used in handling fluorides so as to produce the least dust, little danger to the operators is involved; but as a precaution, operators should wear masks when filling hoppers, and should wear rubber gloves and wash their hands after each filling.

F. J. Maier—"Fluoridation of Public Water Supplies;" *Journal American Water Works Ass'n*, December.

### Electrolysis in Connected Aqueducts

The Mokelumne aqueduct, built 25 years ago, is a 65" riveted steel pipe line, bituminous coated. In 1947 was begun a parallel line of 67" welded steel pipe, coated outside with concrete, to increase the capacity, which was connected with the older line at strategic points. The original aqueduct has been under cathodic protection for 16 yr. Recently it was discovered that the older aqueduct was leaking at a point 6,000 ft. from one of the cross-connections, and it was found that 16 amp was discharging from the bituminous coated pipe over a distance of 2500 ft. through a soil of low resistivity. It is believed that the new pipe with concrete coating tended toward the alkali side and formed a cathode, while the bitumen-coated pipe, being more acid, formed an anode; and that electric current was discharging through cracks caused by soil stress in the bituminous coating. Electrolytic action has been stopped by placing insulated joints in the cross-connections between the lines, breaking the electric circuit.

David Hendrickson—"Electrolysis in Connected Aqueducts;" *Engineering News-Record*, Dec. 28.

### Snow Surveying

The City of Los Angeles has for 25 yr. utilized snow survey data in preparing forecasts of runoff from its Owens river watershed, and during that period the average error in the resulting forecasts has been less than 10%. The survey consists in measuring the depth of snow on Feb. 1 and March 1 at a number of strategic locations, and determining

the water content at each point by weighing the snow brought up by a sampling tube. This sampling tube has an effective diameter of 1½", and is made in short sections that can be combined to give a length of more than 20 ft. The data are obtained from 12 survey courses, situated over 100 miles of crest of the high Sierras. Each course is located, measured, marked, and mapped so that snow measurements can be taken at the same point every year.

Burton A. Grant—"Snow Surveying and Forecasting Runoff for Water Supply;" *Water Works Engineering*, December.

### Regulating Air Conditioning

Efforts to limit the amount of public water supplies used for air conditioning and other refrigeration are justified where the source of supply is inadequate or approaches inadequacy, with little hope of augmenting the supply economically. Even where this is not the case, the cost of tearing up streets for en-

larging sewer or water main capacity and enlarging filter plants to meet purely summer loadings cannot be justified where these loadings can reasonably be avoided. For the former class, immediate restrictions are the only answer. For the latter, measures should be taken such that, if inadequacy approaches, augmentation of facilities may be financed by the revenue received from those customers that created this inadequacy. The committee that submitted this report feels that demand charges furnish the solution. These might be based on size of meter, but the committee favors, instead, a 15-min.-interval consumption basis. A third method is applying a special rate to all accounts operating on a low load factor. Any of these, if the rates are properly based, would encourage the installation of water conservation equipment. Unfortunately, a demand meter that may be economically purchased, operated and maintained has not yet been devised.

Committee on Water Use in Air Conditioning and Refrigeration—"Regulation of Air Conditioning and Other Refrigeration;" *Journal American Water Works Ass'n*, December.

### County Equipment

(Continued from page 54)

we can use it to hoist timbers, steel, etc. J. Walter Martin, County Commissioner, Fremont County, District 2, Calif.

A tail lift has been installed so that we can load heavy articles onto stake body trucks with mechanical power. W. A. McMullen, Jr., Engineer, Pinellas County, Fla.

Two new ideas have been contributed by James G. Cooney, Superintendent of Highways, Clinton Co., Ill. "We have a stake body truck; we place a water sprinkler tank on this; or we remove it and replace it with a deck containing a welding outfit, including a portable generator. Also, we built a home-made boom and leads, bought a second-hand 2,000-lb. drop hammer and mounted same on rear of a D7 Caterpillar. We now have a very practical pile-driving outfit.

DuPage County, Ill., O. B. Dold, Sup't. of Highways, built a long-wheelbase chassis for centerline striping. John S. Robinson, Road Supervisor, Newton Co., Ind., purchased a loader and attached it to his Austin Western motor grader to provide a handy equipment for

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Fluoridation of Water Supply Under Consideration at Tampa, Fla. By Carl J. Lamb, Marine & Naval Consultant. December, Pp. 1110, 1127.



picking up berms. Theodore Robinson, Engineer, Wayne Co., Iowa, has devised a special cab for survey parties, for use on a pick-up truck.

### Killing Weeds and Pulling Piling

Robert J. Wallace, Engineer of Buchanan Co., Iowa, has a "weed sprayer mounted on a truck with a boom" presumably to permit spraying of the entire right-of-way, both sides, at one trip. A somewhat similar device was apparently used by A. W. Young, Engineer, Allen Co., Kansas, except that he used a tractor. Mr. Young desires to hear from other engineers having experience with complaints of crop damage from drifting sprays of 2,4-D. Mr. Young's address is Iola, Kans.

A hoist for pulling piling has been devised by Ralph H. Greenwood, Engineer, Fremont County, Iowa. George M. McKee, Jr., Engineer, Sherman Co., Kansas, designed a spray bar for more effective use of the county weed spraying outfit. A weed spray with truck mounting was also designed by J. I. Rice, Engineer of Douglas County, Kans., while A. L. Eshelman, Engineer of Ottawa Co., Kans., made an automatic spray bar for two 1,500-gal. water tanks. Edwin P. Knapp, Engi-

neer of Smith Co., Kans., devised a mechanical spool for handling barbed wire.

E. L. Walker, Engineer, Pottawatomie Co., Kansas, is working on a pick-up crusher for handling windrowed rock on the road. Rufus Kirk, Engineer, Sedgwick Co., Kans., reports "foundation sounding pumps and jetting, hollow augers and fish-tail jets." H. J. Rich, County Engineer and Manager, Kalamazoo Co., Mich., rebuilt an old small patrol grader and equipped it with a windrow eliminator; this will be towed by a truck. Carl C. Nelson, Engineer, Douglas Co., Minn., reports "a new type of snow fence driver, which is mounted on a regular dump truck." In Carlton Co., Minn., N. C. Nickerson, Engineer, reports that he has devised a "portable gravel loader."

A sprayer for using Esteron 2,4-D; a gravel testing auger; and a snow fence post pusher are reported by A. B. Klessig, Highway Engineer, Martin Co., Minn. A device to dismount large tires is reported by H. G. Elletson, Engineer of Benton Co., Minn. M. E. Gibbs, Road and Bridge Supervisor of Pemiscot Co., Mo., has mounted an A-frame and winch on the front of a truck for

laying heavy concrete culvert pipe. A back- or bank-sloping blade to be used on a bulldozer has been devised by E. O. Muller, Engineer of Benton Co., Mo.

H. H. Benson, Surveyor, Ravalli Co., Mont., has a power operated boom on a 6 x 6 truck for handling concrete pipe. W. P. Burke, Surveyor, Carbon Co., Mont., has devised some equipment trailers, and R. D. Hampton, Highway Engineer of Fillmore Co., Nebr., a snow fence post driver. John D. Forsyth, Chairman, Board of Supervisors, Knox Co., Nebr., says "we bought a large Mack truck and put a boom with leads on it to do bridge work."

Albert M. Zuill, Surveyor and Asst. Road Supervisor of Natrona Co., Wyo., says: "We fitted out a new Dodge power wagon (4-wheel drive) as a water supply truck to accompany the county fire truck on fire runs. We installed a 500-gal. water tank and welded light steel panel boxes on sides of truck to carry 1,200 ft. of 1½-inch canvas hose and miscellaneous fire equipment. We installed overload springs on the truck."

A number of other county engineers and officials mentioned equipment which, due to the brevity of

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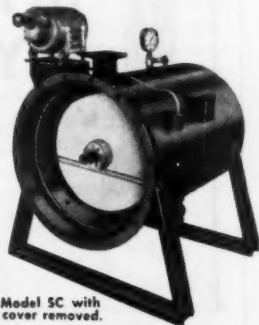
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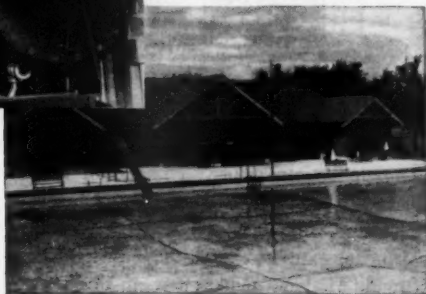
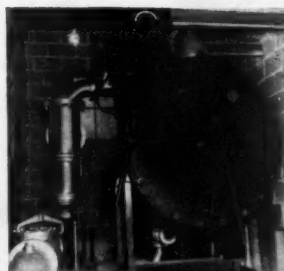
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368,000 gal. pool at Red Wing, Minn., equipped with Model SC filter operating on a one week cleaning cycle. Entire installation is in 13' x 17' area.



the description given, we were not able to interpret or evaluate properly. These were, therefore, omitted. For the reason that many of the items mentioned in this article were described very briefly, it is possible that improper interpretations have been given to some of them. Though we have written a number of the men mentioned herein, it was not possible to make a complete check. However, we believe that, with few exceptions, the ideas described are excellent ones, and should be of value to other engineers and to manufacturers, as well.

## Truck-Mounted Boom for Street and Traffic Lights

W. J. Granberg

SEATTLE'S municipal light department has acquired a new truck-mounted, double-jointed boom which is aiding materially the city's \$4,000,000 program of street illumination. This program calls for installation of mercury vapor lamps along arterial routes. Most of the lights are being installed at heights of about 33 feet, an awkward height at which to



● Truck-mounted boom.

work with former equipment, considering traffic and parked cars.

The new hydraulically operated unit carries an operator to the necessary working height in a self-leveling cage, or platform, at the end of the double-jointed boom, assuring a convenient working position. More than that, the boom can reach out over parked cars, or even over the sidewalk, with the cage still maintaining a level floor. The boom itself will swing in an arc of 180 degrees on a horizontal radius of 20 feet.

The cage has three levers for fingertip control by the operator. Hydraulic power for operation of the unit is derived from a power takeoff on the truck engine. The rig may be mounted on any standard truck chassis of one ton or larger. Called the Hi-Tender, this device is proving of value in servicing street lights and overhead wiring, and also in installing and maintaining overhead traffic signals.

## BRITISH INDUSTRIAL WASTE AND SEWAGE TREATMENT RESEARCH

The British Water Pollution Research Laboratory has been working for some years on the treatment of sewage by biological filtration. One of the chief factors which limit the rate at which the sewage can be treated in a filter is the accumulation on the surface of the medium of obstructive growths of fungi and sometimes of algae. This leads to "ponding" or water-logging of the surface—a condition often met with at sewage disposal works. There have been indications, however, that if the rate of supply of settled sewage to a filter is increased sufficiently the tendency to pond may be reduced. This may possibly be due to the increased mechanical impact of the liquid on the surface of the filter which prevents the fungi from adhering to and growing on the pieces of filtering medium, but little is



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known of this, and other factors may be involved.

Experiments have been begun with a pilot plant to investigate the treatment of sewage by biological filtration at rates much higher than are commonly employed at a sewage disposal works. During the year the rates tried have ranged from 100 to 1000 gallons per cubic yard of medium per day and the plant is now being modified to take even higher flows. In general, although some ponding occurred it was not sufficient to interfere much with the experiments even at the highest rates. As the rate of application is increased the quality of the treated effluent deteriorates but the most striking observation from the experiments is that the efficiency of a filter, expressed as weight of oxidizable matter removed per cubic yard of medium per day, increased almost linearly with the rate of application. For example, it is about ten times as great when the rate is 1000 gallons per cubic yard per day as when it is 100 gallons per cubic yard per day. Biological filtration at these high rates, because of its economy, might sometimes be of value, for instance at a works on the coast where it was desired to remove a proportion of the oxidizable matter from sewage as cheaply as possible but where an effluent of the first quality was not necessary. The experiments are being continued.

#### Micro-Straining and Pressure Filters

The report for 1949, which was recently issued, contains further results of experiments with a pilot plant at the sewage disposal works at Luton on the removal by mechanical filtration of humus from the sewage effluent. Two processes have been tried—filtration in pressure and open gravity rapid filters, and treatment by micro-straining. Both these processes largely reduce the concentration of suspended solids in the sewage effluent. An interesting point is that removal of the humus brings about also a very marked reduction in the biochemical oxygen demand. Treatment in open rapid gravity filters reduced the demand of the Luton effluent by about 60 to 75 per cent.

Other work described deals with the treatment of sewage containing spent gas liquor, control of nuisance from filter flies, and effects of various methods of treatment on the numbers and types of bacteria

in sewage. Work was also reported on the treatment by biological processes of waste waters from the manufacture of special types of paper, mainly from rag and hemp. One difficulty in applying a biological method of purification is that the waste waters are usually so alkaline as to inhibit the growth of bacteria. In the present work the alkalinity was neutralized by adding carbon dioxide. Another inhibiting substance found to be present was chlorine or, more often, compounds of chlorine with organic substances. These had first to be

removed by addition of ferrous sulphate, excess of which was oxidized by blowing in air. The ferric hydroxide so formed was removed by sedimentation. When the waste waters, after treatment in this way, were further treated in a pilot percolating filter effluents of very good quality were obtained. This investigation is to be continued and extended.

Copies of the report are available at 40 cents from the Department of Scientific and Industrial Research, Charles House, 5-11 Regent St., London SW 1, England.

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PUBLIC  
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## DIGESTS

## THE HIGHWAY AND AIRPORT DIGEST

**Equipment  
Proves Economical**

The Galena, Ill., Dept. of Streets & Improvements up to 1950 functioned on practically manpower alone. In 1949 taxpayers voted \$20,000 to purchase street equipment, and the department bought a motor grader with an end loader, scarifier and snowplow attachments. Using this, it was found possible to reduce the department's manpower by more than 40%; to do more grading in one day than could formerly be done in a week using the old tractor and towed grader with two men. It has dug ditches in 4 minutes that took a man with pick and shovel 4 days. Using the end loader, it takes 4 minutes with two men to load a truck with material, where it formerly took 4 men 25 minutes.

R. F. Mott—"New Equipment Improves Economic Status;" *PUBLIC WORKS*, January.

**Designing  
Traffic Interchanges**

When two highways cross, there are two through movements on each of them, four right turn movements and four left turn—a total of 12. It is simple to design free-flowing connections for the right turns, but the left turns are responsible for the various types and shapes of interchanges that have been designed. Determination of the type must be based on several influencing factors, including a complete traffic analy-

sis, available funds, topography, building developments, and right-of-way limitations. The traffic analysis should include A.D.T., peak-hour volumes and time of peak-hour flow for each 12 of the movements through the intersection.

Interchanges can be classified into two general types—the direct, in which left movements turn more or less naturally toward the left; and the indirect type, in which the left turn begins right and then goes through a 270° loop. The latter includes the cloverleaf with its various modifications, the diamond type, the bridged rotary, the trumpet type, and combinations of these. The 2-quadrant cloverleaf eliminates left turns for the major movements, while the minor movements turn left across traffic. In the 4-quadrant cloverleaf all left-turn conflicts are eliminated on both cross facilities.

Sam Helwer—"Traffic Interchange Design;" *California Highways and Public Works*, November-December.

**Frost Control by  
Chemical Treatment**

Chemical treatment of soils can be used to prevent freezing of subgrade soil or foundations during cold-weather construction; to permit the drainage of early-melt water trapped above frozen ground; and to minimize frost action and control the loss of subgrade support during the spring melting period.

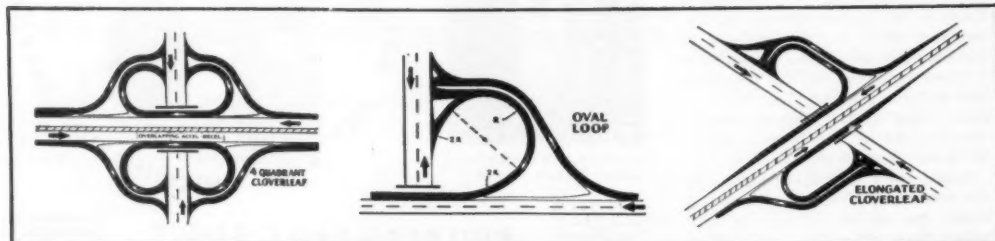
The freezing point of pure water is lowered from 32° to 23° by the addition of 10% of commercial calcium chloride, and less or more in proportion to the amount of the salt used. Soil begins to freeze at a lower temperature than water. To permit uninterrupted paving at temperatures not below 10°-15° F it is recommended that 1½-2 lb. of calcium chloride per sq. yd. be bladed or mixed into the top 2" or 3" of the subgrade material.

When the surface begins to thaw in the spring, the moisture can not drain into the soil because of the unmelted ice below, and the road becomes soft. A method of using vertical drains backfilled with gravel and calcium chloride has proved successful. In Iowa such vertical drains, 7" in diameter and 6 ft. deep, have been placed at 5-ft. intervals, drilling the holes and filling them with clean gravel to which has been added 3½ gal. of a solution of 100 lb. of calcium chloride to 30 gal. of water; the complete cost of which was about \$1.00 per hole.

H. R. Smith—"Controlling Frost Effects on Roads with Calcium Chloride;" *Roads & Engineering Construction*, December.

**Rolling a  
Culvert into Place**

On Route U. S. 90 in Florida an old wooden bridge 22 ft. wide and



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67 ft. long has been replaced by a corrugated steel multiplate pipe culvert 13 ft. in diameter and 86 ft. long, by an unusual method. The pipe was assembled alongside the road at one end of the bridge. Then one span of the bridge was removed and a dirt fill was dumped into the channel to furnish a bed for the pipe at the desired level. The railing of the bridge having been removed, the culvert pipe was rolled onto the road, swung till at right angles to it, and rolled to where the span had been removed and dropped into the water.

"Huge Pipe Erected on Dry Land to Speed Bridge Replacement;" *The Highway Magazine*, November.

#### Two-Way Radio In the District of Columbia

A 2-way radio telephone is owned by the District of Columbia and maintained by the Highway Dept. but is available for use by all the public works services. It is difficult to evaluate the benefits in dollars, but discernible savings include savings in travel time and mileage for supervisory employees, better utilization of equipment, reduction in number of equipment units needed

for the various services, and a general speeding up of all operations. The Director of Highways can contact any of his inspectors and foremen from either his car or office. Engineers or other supervisors can call for needed equipment without leaving the job. Mobile units of 50-watt capacity are placed in supervisors' and inspectors' cars, snow plows, trucks and other vehicles in the public works services, 68 in all. Also walkie-talkie units are used for field work, traffic counts and other isolated miscellaneous work, using portable 2-watt units.

J. N. Robertson—"Indispensable is the Word for Two-Way Radio in District of Columbia Highway Department;" *Roads and Streets*, December.

#### Remixing Old Bituminous Surfacing

California Div. of Highways has been reworking old bituminous pavements by breaking them up, incorporating them into the base and adding a new surface. Last July and August they tried a new method which enabled them to use the old asphalt as surface material by adding a solvent developed by the Shell

Oil Co. as an asphalt softener. The test was made on a pavement laid in 1936 which was extremely tough and hard and was 8½" deep. This was broken up with a roter, followed by a grid roller loaded to 28,000 lb., which broke the material into chunks 8" or 10" in diameter. These were broken to proper size for mixing by an Athey portable breaker. Then 0.8% to 0.9% of the softener was introduced through a Gardner mixer, and 33% of 5/16 to No. 8 screenings were added to increase the stability, and this was windrowed. It was then spread in two courses by means of a motor grader. The lower course was compacted with a grid roller and the top course with a steel-tire, 8-ton tandem roller. After two months of traffic averaging 17,000 vehicles per day, the surface is in excellent condition, non-skid, with no flushing of asphalt to the surface and no indication of distortion.

Earl Withycombe—"Softening Solvent Helps Pulverize and Remix Old Bituminous Surfacing;" *Roads and Streets*, December; and "Successful Tests in Reworking Pavement Foundations Are Made;" *California Highways and Public Works*, November-December.

## New 300 ton Nichols Monohearth Mechanically Stoked Refuse Incinerator Now under construction for TOWN OF BROOKLINE, MASS.

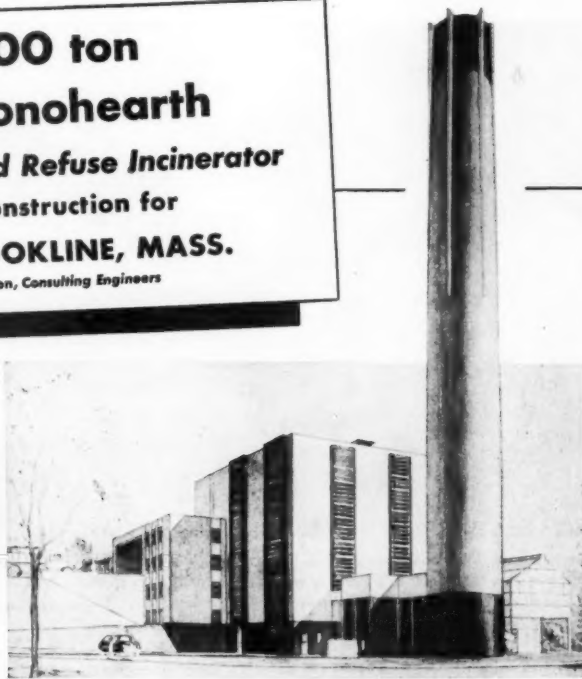
Metcalf & Eddy, Boston, Consulting Engineers

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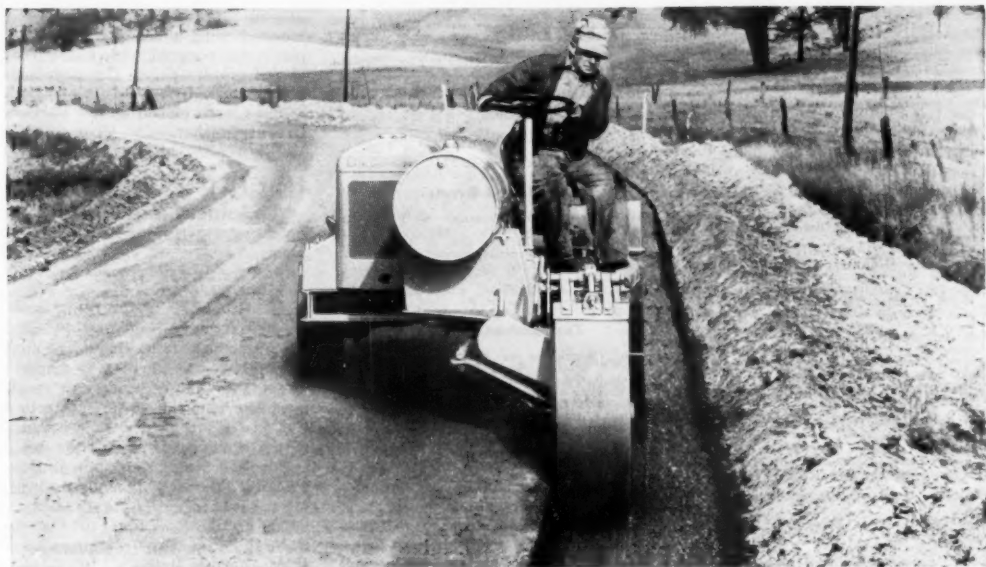
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## ROAD WIDENING

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Road widening came under the heading of "better solution wanted" back in the days when trench compaction meant costly hand-tamping—or using a 3-wheel roller at precarious angles on work it was not designed to perform. Today, thanks to the Buffalo-Springfield TR3-B Trench Roller, the headaches and hazards have been largely removed from this type of work.

The specially-designed TR3B trench roller has a 16" wide compression roll\* which works *in* the trench. The large diameter of this roll prevents shearing or pushing of surface materials; insures an even penetrating compaction. Likewise, means are provided to increase the weight of the roll to produce compressions in excess of 325 lbs. per inch of roll face width.

\*20 in. wide compression roll also available.

The roller is kept on a level plane by means of a small-diameter road wheel, which is raised or lowered hydraulically to suit the depth of the trench. The wheel control valve is conveniently located at the operator's station, permits him to hold the roller on a level plane while working in trenches up to 16" deep. Automotive-type steering and a compact instrument panel further simplify control.

Built with an eye to economical performance and low maintenance costs, the TR3B has increased production and trimmed operating costs on all types of trench compaction. If road widening looms prominently in your job picture, it will pay you to learn more about the Buffalo-Springfield Trench Roller from your nearest distributor. See him today.

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Thin Concrete Pavements—What Service Life Can They Provide? By *Hugh Barnes*, Dist. Engr., Portland Cement Ass'n. January, Pp. 96-97.

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Improving Local Roads with Tar. By *Geo. E. Martin*, Cons. Engr., Barrett Div. December, Pp. 35-36.

## California Highways &amp; Public Works

Tigon Pass Cement-Treated Base Successful at 10,000 Ft. Elevation. By *S. Lewis Rohrer*, Dist. Materials Engr. November-December, Pp. 3-7.  
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## The Constructor

Maryland's Highway Test Means Much to U. S. Trucking Industry. By *Norman H. Gregg*. December, Pp. 33-35.

## Public Works

Equipment Used by County Engineers. January, Pp. 42-43.  
New Equipment Improves Economic Status. By *R. F. Mott*, City Engr., Galena, Ill. January, Pp. 44-45.

## Roads and Engineering Construction

Controlling Frost Effects on Roads with Calcium Chloride. By *H. R. Smith*, Solvay Sales Div. December, Pp. 86-86, 106.

Widening and Resurfacing Old Pavements with Asphaltic Materials. By *Herman C. Helme*, Dist. Engr., Asphalt Inst. December, Pp. 87-88, 102.  
Traffic Trends on Rural Roads. By *Thomas B. Dimmick*, U. S. B. P. R. December, Pp. 89-92, 114.  
Design of Highway Skew Slab Bridges with Integral Curbs. December, Pp. 93-94, 96.

## Roads and Road Construction

Bog Blasting. December, P. 374.

## Roads and Streets

North Carolina Bond Program. By *Walter R. Macatee*. December, Pp. 31-40.  
Two-Way Radio Indispensable in District of Columbia Highway Department. By *J. N. Robertson*, Director of Highways, D. C. December, P. 44.  
Concrete Widening Placed with High-Speed 4-Unit Outfit. December, Pp. 52-54.

## The Surveyor (England)

Road Construction on Clay Subgrades. By *D. J. Maclean*, Road Research Laboratory. Dec. 1, Pp. 623-624.  
Landscaping of Roads. By *L. E. Morgan*, Horticultural Adviser, Ministry of Transport. Dec. 1, Pp. 625-626.

## Red Asphalt in London

The Mall in London, best known for the ceremonial processions which move over it on state occasions, but also a traffic bypass from busy downtown London streets, has been resurfaced with red asphalt. On a 3" base course of regular asphalt was placed a one-inch wearing surface composed of a mixture

of red granite and limestone dust blended with a red pigmented asphalt and covered with a seal coat of red granite chips. The pavement has a dark brick-red color. Both courses were placed with a Barber-Greene finisher.

## How To Use Rubber Asphalt Joint Compounds

C. E. Brokaw

Supt., Highway Maintenance Div., Cincinnati, O.

RUBBER asphalt joint filling compounds have been used by Cincinnati for about 12 years. The first work that was done was experimental in nature and not much progress was made in perfecting the use of this material because of the difficulty in regulating temperatures with the equipment then available. Success depends entirely on the use of an oil-bath asphalt kettle with special controls to maintain working temperatures within narrow limits.

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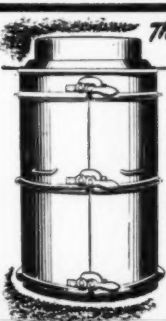
of State Sanitary Engineers show typical State Board of Health requirements and recommendations.

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rubber asphalt joint compound was installed on Heekin Ave. Periodic inspection of this pavement for crack-filling operations over a period of 12 years has indicated that up to 1949, no maintenance was required. Last year, some of the joints were repoured with conventional asphalt cutback material, but a good many of the joints are still in first class condition. Recently, more work of this type has been done and during the past two years the department has rented an oil bath kettle for melting the rubber-sized asphalt. Joints in several concrete viaducts have been filled with good success.

Air is necessary to remove all loose material from the joints before pouring. We believe that the proper treatment of joints in advance of rubber asphalt filling is essential to obtain best results. For this work, it is necessary to have special kettle equipment and special routing equipment. Both of these, however, can be used for other highway work and need not be considered limited use equipment.

The results obtained with rubberized asphalt compounds for sealing joints in concrete structures indicates there is a definite field of

use for such material in street pavement maintenance. We have, we believe, demonstrated the value of this material; and we plan this year to rent a routing machine to remove old expansion joint material, so that we can install the new-type joint material most effectively.

There has not been sufficient time to determine the full length of life of such joints, but it is planned to continue placing a limited amount of this material under various street conditions, so that we may develop for ourselves a crackfilling and joint material that will be superior to anything we have used to date.

#### Philadelphia's 6-Year Public Improvement Program

The Philadelphia City Planning Commission has recommended a 6-year program of public improvements to cost nearly \$427,000,000. This program, scheduled for the 1951-1956 period, covers only the city's most urgent needs. In summary, the improvements will:

Provide for construction of the Schuylkill Expressway system, plus other major highway and bridge projects to be undertaken by the City or jointly with the State.

Complete the Market Street Subway Extension, extend the Subway Surface to 40th and Woodland, and equip the Locust Street Subway.

Improve the quality and quantity of Philadelphia water; complete construction of the vast sewage collection and treatment system, abating pollution of the Delaware and Schuylkill Rivers.

Advance the storm-water control program.

Complete the incinerator construction program, looking toward elimination of burning dumps; complete acquisition of land and equipment for the disposal of non-combustible refuse over a 30-year period.

Complete first-stage construction of the terminal building and other improvements at International Airport.

Provide the sewers, water mains, and paving needed in newly developing areas.

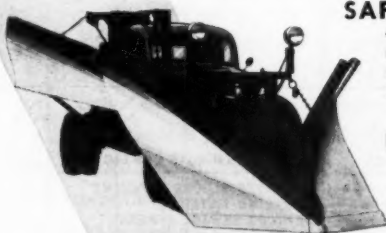
Enable the continuing redevelopment of blighted areas and construction of low-rent public housing.

Further improve the City's health, welfare, cultural, recreational, police, fire and penal services.

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## DIGESTS

## THE SEWERAGE AND REFUSE DIGEST

**Residual Chlorine as  
Test of Chlorination Effect**

The number of residual coliform organisms after chlorination should be considered the test of successful chlorination, rather than residual chlorine. Reduction of coliform organisms to a stipulated number cannot be based on chlorine dosage, as the amount of chlorine required varies, even with different samples of sewage from the same source, and increases regularly for the accomplishment of lower numbers of residual coliforms. Stale sewage requires more chlorine than fresh for the same residual counts. The amount required for similar results with activated sludge and trickling filter effluents is nearly the same, and is lower than that needed for settled sewage. Dilution of sewage with water in the ratio of 1:4 decreases the chlorine required to achieve stipulated coliform residuals by one-half with 5 min. contact time and by nearly one-fourth with 30 min. contact time. Dilution of settled sewage to the same suspended solids concentration as the effluent from the trickling filter results in the same amount of chlorine required to achieve a stipulated coliform organism residual in 30 min. contact time; with 5 min. contact time, filter effluent required more chlorine than did diluted sewage. There is no correlation between the initial count of coliform organisms and the amount of chlorine required. More chlorine is required when the chlorine solution used has a concentration of 5,000 ppm than when the concentration is 200 to 1,000 ppm.

H. Heukelekian and Morris B. Smith—"Laboratory Experiments on the Effect of Chlorine Dosage on Residual Coliform Organisms," *Sewage and Industrial Wastes*, December.

**Efficiency of Activated  
Sludge Under Various Conditions**

Experiments conducted by the Baltimore Bureau of Sewers on the efficiency and performance of acti-

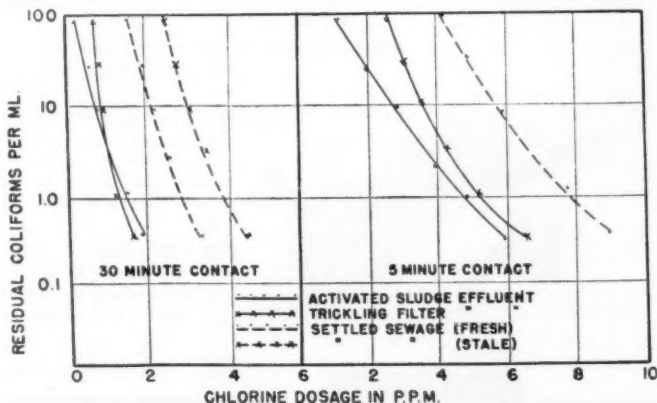
vated sludge under various operating conditions led to the following conclusions: Fresh activated sludge in good condition, when mixed with sewage, was capable of removing, without subsequent aeration, a considerable percentage of the B.O.D. Preaerating activated sludge enhances its capacity in removing B.O.D. from sewage. The greatest removal was obtained when the concentration of suspended solids in the mixed liquor was 500 ppm. However, other factors, such as the types and number of bacteria present, together with their enzymatic secretions, are believed to play such an important role in B.O.D. removal that these factors must be considered when studying the performance of the activated sludge process. There is an indication that maintaining a high concentration of suspended solids in the mixed liquor will, under certain conditions, result in a lowering of the B.O.D. removal. Such reductions are less marked with longer aeration periods.

C. E. Keefer and Joseph Meisel—"Efficiency and Performance of Activated Sludge Under Various Operating Conditions," *Sewage and Industrial Wastes*, December.

**Sewage Treatment  
For a Summer Resort**

The Village of Monticello, N. Y., has a winter population of about 4,300, but the summer population approaches 15,000 and is expected to reach 22,500 in ten or fifteen years, giving a dry-weather flow of 2 mgd. The sewers permit considerable infiltration of ground water and a storm flow of 6 mgd is anticipated. In designing a new plant to replace the old one, it was designed to: 1—give the high degree of treatment necessary to prevent stream pollution and nuisance during the summer months; 2—handle storm flows automatically without interruption to plant operation, providing some treatment for them, and 3—treat the small winter flows adequately and economically.

The new plant consists of a Parshall flume; a combined mechanically cleaned screen and grit chamber; primary settling tanks with sludge-collecting mechanism, which provide 2 hr. detention for 2 mgd plus 1 mgd recirculated from the primary filter and 1 hr. detention for 6 mgd storm flow; two-stage high-rate filters of the biofilter type;



Courtesy Sewage & Industrial Wastes.

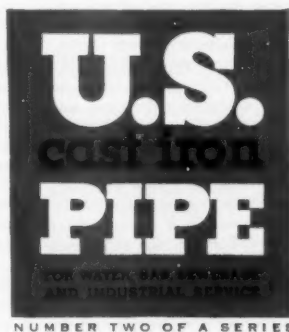
- **AMOUNT** of chlorine required to obtain stipulated numbers of organisms.



*Baltimore's Battle Monument to her heroic dead in the War of 1812, as it looked 100 years ago.*

Baltimore, Maryland has cast iron water and gas mains in service that were installed more than a century ago. In addition, there are more than 28 other cast iron water or gas mains with known records of continuous service for more than 100 years in the older cities of the United States and Canada. Such service records prove that cast iron pipe not only resists corrosion effectively, but is endowed with all the strength factors that pipe laid under city streets must have to meet the stresses imposed by modern conditions of traffic and underground services.

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a secondary settling tank; chlorination; separate sludge digestion; and vacuum filtration of the sludge. The plant was designed for an organic load of 3,750 lb. of B.O.D., and to handle through the settling tanks and filters the entire storm flow, none being bypassed. From the primary tanks the sewage flows to a two-compartment dosing tank. During normal biofilter operation only the dosing tank serving the primary filter will operate, but during flood periods the recirculating pumps cut off automatically and both dosing tanks go into operation. In winter the two filters are operated as low-rate filters without recirculation. During dry weather the primary filter receives the raw sewage flow plus a constant 1 mgd of recirculated primary effluent. The secondary filter receives a constant 3 mgd, the secondary settling tank supplying the amount necessary to provide this if the raw sewage flow is less than 2 mgd. The existing sand beds of the old plant are being retained and will be used for polishing the effluent if this should prove desirable. The two digesters provide 3½ cu. ft. per cap. at maximum load. The primary digester is heated; the secondary is of the gasholder type. It is expected that with the present population of 15,000 the effluent BOD will not exceed 20 ppm; that with 22,500 population it will range from 25 to 27 ppm; and that in cold weather, without recirculation, the BOD will range from 45 to 55 ppm.

"Modern Sewage Treatment for a Summer Resort;" *PUBLIC WORKS*, January.

### Freezing for Dewatering Sludge

For the past two or three years experiments have been carried on in England on the use of freezing as an aid to the dewatering of sewage sludge. Beginning with laboratory experiments, then using a domestic type refrigerator, the investigators designed a freezing machine for using the latent heat of fusion of one batch of previously frozen sludge to cool the refrigerant being circulated to freeze the next. The experiments were described by the investigators in a paper, which gave the following as the main conclusions:

- (1) The settlement of all types of sludge is promoted by freezing.
- (2) Settlement is accelerated by freezing with chemicals, but the percentage settlement at the end of an hour is approximately the same whether chemicals are used or not.

(3) Filtration, after freezing with chemicals, is remarkably accelerated; filtration times in the best cases being reduced to a few seconds with ¾-in. cakes. The filter-cakes are friable and of high solids content, being 30 per cent in some instances.

(4) The chemicals used were chlorinated ferrous sulphate, chlorine gas and aluminum sulphate, and doses were up to 1000 parts per million of the active ion. The best results were obtained by the use of aluminum sulphate.

(5) Complete freezing is essential: freezing must be fairly slow: "flash" freezing is ineffective.

(6) Some saving of latent heat of fusion is practicable in a suitable installation.

(7) The method of thawing is immaterial, as long as it is not associated with vigorous agitation.

(8) The supernatant liquids on settlement are, on an oxygen absorption basis, not much worse than ordinary sewage.

No estimates as to the cost of the process were offered.

"New Sludge Dewatering Method May Take Lead in Works Practice;" *Municipal Engineering*, Dec. 8.

### Sewage Service Charges

The author said in October 1950 that at least 273 cities of more than 10,000 population had adopted the use of sewage rental charges, and that a total of approximately 450 cities were using the plan. Among the largest cities using these charges to finance their disposal operations are New York, Philadelphia, Cleveland, and Detroit. The chief cause of the recent adoption of this method is the inability or difficulty of raising by taxation the funds needed for pollution abatement ordered by the states. The funds raised by these charges are used to finance the construction and operation of the works necessary for this, and the sales appeal of the revenue bonds depends on the confidence of investors in the certainty that the income from service charges will be sufficient for retiring them. There are 13 states which do not have legislation permitting revenue bond financing for sewer construction.

Answers to a questionnaire disclosed the use of six principal bases in fixing rate schedules for sewage service charges, although many others are used by individual cities. These six are: 1—Uniform rates for all properties. 2—Number and type of sewer connections. 3—Type of

property. 4—Number and type of plumbing fixtures. 5—Water consumption. 6—Size of water meters. Water consumption represents the most accurate measure of the relative use of a sewerage system, but is limited to entirely metered services. This type is subclassified as metered water charges, combined sewage and water charges, charges based on metered water and B.O.D., and a fixed percentage of the water bill.

Myron W. Tatlock—"Sewage Service Charge Practice;" *Sewage and Industrial Wastes*, December.

### The OCO System of White Water Recovery

Based on four months of operating experience at the Ohio Boxboard Co.'s mill, it is concluded that the OCO water system offers a practical solution to the recovery of industrial process water, especially paper mill white water. Such recovery is very desirable because of the need to conserve diminishing supplies of fresh water, to recover heat and material going to waste with the used water, and to eliminate pollution caused by dumping such waste water into streams. Essentially, the OCO water system is a program of selective return of high-solids process water to the system, and positive filtration of the remaining low-solids white water so that the solids can be recovered as "furnish", and the filtered water is of such sparkling clarity that is freer of suspended solids than most paper mill fresh-water supplies. The filtration unit used is a pressure-type plate and frame filter, using a diatomaceous silica filter aid. Filter papers placed over the filtering medium eliminate the need for precoating the press with a heavy layer of filter aid before each cycle.

George C. Ehemann, L. K. Burnett and John C. Waddell—"Application of the OCO Water System to Paper Mill White Water Recovery;" *Sewage and Industrial Wastes*, December.

### Pollution of Ground Waters

Rain water, in passing through the ground to springs or other outlets, is generally purified of impurities washed from the air. But the purifying action of the soil has its limitations, and waste waters carrying certain offensive tasting, poisonous, or otherwise undesirable materials (such as some creosote-type compounds, chromates, picric acid, and common table salt) may find



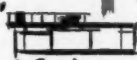
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*Highlights* of Aerator-Clarifier superiority are listed at the right, but it will pay you to check the complete story of the design and operating characteristics. A Dorr engineer will gladly tell you more . . . without obligation.



### **DORRCO AERATOR-CLARIFIER ADVANTAGES** as compared with separate preaeration and sedimenta- tion tanks.

1. Compact . . . single tank saves ground space.
2. No solids interference in aeration chamber . . . grit and heavier solids settle quickly, avoiding interference with flocculant material.
3. No breakup of floc structure . . . low transfer velocities from Aerator to Clarifier section eliminates breakup of flocculated material.
4. Minimum of short circuiting . . . spiral-flow aeration effect in Aerator minimizes short circuiting.
5. Simple maintenance . . . aeration tubes are removable for cleaning or replacement without interfering with operation of the unit.
6. Low cost . . . single tank and simple design cut installed cost.



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their way into ground-water reservoirs without being purified. Ground water so contaminated moves so slowly that such contamination sometimes persists for years. In one case wastes from a plating plant were five years reaching a city well only 1,000 ft. away. Underground reservoirs that are contaminated now will stay contaminated for a long time and the area of contamination will gradually expand. It is not necessary to prevent the disposal of all waste water into the ground, but before permitting this there should be considered, first, how much damage can the material do; second, what chance does the waste have of getting into the ground; third, what harm is the waste apt to do if it does reach the ground-water reservoirs; and fourth, where is it likely to go after it gets into ground water.

Norman Billings—"Ground Water Pollution in Michigan;" *Sewage and Industrial Wastes*, December.

### Animal Parasites In Sludge

From the point of view of disease communication, the most important of the protozoa is *E. histolytica*. The most important of the helminths are tapeworms, roundworms, and hookworms. *Histolytica* produces amebiasis and amebic dysentery. These are essentially water-borne diseases, but may perhaps be communicated from nightsoil through vegetation. The cysts may survive for weeks or months in water and sewage. Recent results indicate that 2 to 15 ppm of chlorine will kill the cysts, depending on temperature, concentration, pH, contact time and cyst density. In water and sewage treatment, sand filters were found to retain cysts most efficiently.

The following conclusions were drawn from the survey on the parasitic intestinal helminths.

1. The eggs of these organisms are fairly resistant in soil, sludges, and nightsoil, depending on external conditions.
2. The eggs of the genus *Ascaris* are the most resistant of the eggs of this type of organism not only to chemicals and disinfectants, but also to environmental conditions.
3. Survival in soils and sludges depends on the maintenance of a certain minimum moisture and on temperatures below the lethal death point. Low temperatures are survived, although development is retarded.
4. The type of soil and shading

determine the moisture and temperature conditions so that they greatly affect the survival of eggs.

5. Vegetables grown in soil contaminated with infected sewage or nightsoil may be a source of infection, but a comparison with other sources of infection has never been clearly demonstrated.

6. Stored nightsoil or sewage sludge may contain viable eggs for several months, but composting for a sufficient period appears to result in a comparatively safe, useful product.

7. Very complete sewage treatment is necessary to free completely the liquid from helminth eggs.

Willem Rudolfs, Lloyd L. Falk and Robert A. Ragotzkie—"Literature Review on the Occurrence and Survival of Enteric, Pathogenic and Related Organisms in Soil, Water, Sewage and on Vegetation;" *Sewage and Industrial Wastes*, November.

### Extinguishing a Fire in an Open Dump

In Brighouse, England, uncontrolled dumping into an old quarry resulted in the accumulation of all kinds of combustible matter, which finally was set on fire unintentionally. The fire penetrated the entire dump and the odors became a serious nuisance. Applying vast quantities of water failed to extinguish the fire. An earth thermometer showed temperatures well above 300° C. in the mass. The fire was finally extinguished as follows: First, all cracks and fissures were packed and rammed with screened dust (probably largely ashes). Then the surface was covered with a 4-ft. layer of earth, first covering the hot spots. Occasional cracks appeared in the earth and these were filled and rammed with dust, which seeks and seals cracks, fissures and other apertures.

J. F. Aspinall—"Constructive Controlled Tipping;" *The Surveyor*, Dec. 1.

### Industrial Wastes in Large Sewerage Systems

The many difficulties caused by industrial wastes which are frequently encountered by small sewerage systems are not commonly found in large municipal systems. The principal sources of difficulty in a large system may generally be attributed to intermittent discharge of a relatively few wastes. It may be essential to pretreat these wastes before they enter the sewers. Where the population equivalent of the in-

dividual wastes in the sewers is less than or does not appreciably exceed the domestic load, little interference with treatment works operation is to be expected. The use of dilution as a method of treatment of industrial wastes in the large city sewage treatment system is valid, and it should be considered that the sewers themselves are a means of providing dilution of wastes as well as of conveying them to a point of disposal.

Isadore Nusbaum—"Effects of Industrial Wastes on Municipal Sewage Works at Detroit;" *Sewage and Industrial Wastes*, December.

### Utilization of Natural Purification

In designing sewage treatment it is proper to take advantage of the ability of the stream receiving the effluent to handle a pollution load by natural purification and maintain a desired dissolved oxygen content. In doing so, allowance should be made for droughts, determining the relation between allowable pollution load and amount of runoff to maintain the desired stream condition. A plant treating municipal sewage should then be

designed to effect the desired degree of purification at the time of the most severe drought. However, at times of more abundant stream flow, the plant can be operated at less than its maximum effectiveness; seasonal or weekly schedules of operation, correlated with runoff and temperature, will result in substantial savings in power, chemical, maintenance and other operating costs. In the case of industrial wastes, it is possible to control production, reducing it in times of drought; and thus the capacity of the treatment plant can be reduced to that needed to treat normal amounts of waste under normal conditions of stream flow, with corresponding reduction in the size and cost of the plant.

C. J. Velz—"Utilization of Natural Purification Capacity in Sewage and Industrial Waste Disposal;" *Sewage and Industrial Wastes*, December.

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Evaluation of Wastes Disposal Problems in the

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On this basis, using raw against recirculation (final), the reduction is 80 per cent. Using combined recirculation and raw against recirculation (final), reduction is 50 per cent. The purpose of using concentration loadings is that graphically, the operation of the filter can be tied down in a narrower, tighter band when charted against either the per cent reduction, or removal of BOD in pounds per cubic yard. We believe that this method of determining filter efficiency more nearly illustrates just what the filter is capable of doing.

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From the basic design data accumulated, we are able to determine the size of a waste treatment plant, and to determine its cost. To reduce both size and cost of the installation, a study of treatment at the source is indicated. This covers spillage, process change, and reclamation of effluents at the source for re-use in the manufacturing process. The cost involved in these changes is then balanced against the installation and operating cost of the treatment works.

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In the chemical manufacturing industry, it has been found that perhaps one-half of the waste water discharged is polluted, and the other half is not. The unpolluted portion comes from cooling towers, water jackets, blowdowns, condensate, etc. The unpolluted portion of the waste effluents are a factor when the de-

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sign of the settling tanks is under-  
taken, and is of considerable impor-  
tance when a pre-treatment plant  
is indicated with the discharge going  
to a municipal plant for final treat-  
ment, the charge for final treatment  
to the industry being based on both  
BOD and gallonage.

Industry, in its final determination  
on how best to take care of its  
waste, must take all of the follow-  
ing factors into consideration:

1. Process changes.
2. Diversion of unpolluted wastes.
3. Treatment at the source.
4. Building a complete treatment  
works.

5. Pretreatment with final treat-  
ment by municipality for a fee.

In arriving at a decision, it takes  
the work of sanitary engineers,  
chemical engineers, production men  
(who look forward to plant and  
process expansion), and many oth-  
ers to devise a means of industrial  
waste treatment satisfactory to in-  
dustry and to the public.

This article is based on a paper  
by Mr. Lose before the Metropoli-  
tan Section, New York Sewage and  
Industrial Wastes Association.

**Using Motor Trucks**

(Continued from page 39)

**Trailer for Cleaning Sewers**

WE have a "Flexible" sewer  
cleaning outfit, consisting of a  
power drive, a carry-all trailer with  
a rod and reel stand permanently  
mounted on it, together with 400  
feet of rod and necessary acces-  
sories. We have had the outfit near-  
ly two years and have not had oc-  
casion to use it over about a dozen  
times, but in my opinion, the ma-  
chine has already more than paid  
for itself. We are fortunate in hav-  
ing good fall on most of our sewers,  
and not much root trouble, but  
every now and then we get an ob-  
struction that a tape will not dis-  
lodge, and it is either dig up the  
main or run the Flexible down to  
it. So far the Flexible has always  
done the job.

We have a couple of lines that  
are rather flat and they had been  
giving us trouble until we cleaned  
them out when we first got the  
Flexible, but they have given us no  
more trouble.

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routine cleaning job, two men can  
easily handle the equipment.—R. W.  
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# News

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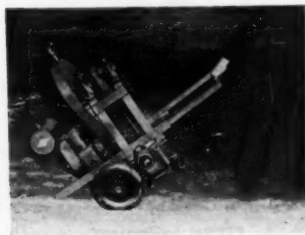
Handles most anything.

and salt without belt changes or the use of special attachments. It is especially designed for use by smaller municipalities and is just as effective in handling road patch material as in removing snow. It loads heavy material at  $1\frac{3}{4}$  to  $2\frac{1}{4}$  yds. per minute; snow at 6 to 8 yds. per min. Full data from N. P. Nelson Iron Works, Inc., Clifton, N. J., or by using the coupon.

Use coupon on page 93; circle No. 2-1

## Light-Weight Portable Diaphragm Pumps

Weighing only half as much as previous pumps of this type, these two pumps will lift from 25 ft. and



Light and portable pump.

handle liquids almost thick enough to shovel. The 2-inch unit will handle up to 2,100 gpm; the 3-inch up to 3,200 gpm. The pumps have Briggs & Stratton engines, with 6 to 1 geared speed reduction. Full descriptive literature from Marlow Pumps, Box 566, Ridgewood, N. J., or by using the coupon.

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## Atomic Radiation Detector

Called a "radiation monitor," this instrument weighs less than a pound and is small in size. It is equipped with a self-contained power source and has neither tubes nor batteries. Radiation measurements are read directly from a pointer. The monitor was designed for use by engineers, scientists and technicians and can warn of the presence of radiation in amounts much less than are dangerous. Data from General Electric Co., Schenectady 5, N. Y., or by using the coupon.

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## Light-Weight Paving Breaker

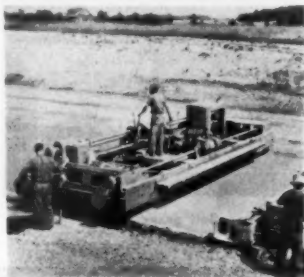
This 50-pound paving breaker can be handled by one man, even on horizontal or overhead work, and is suitable for brick, asphalt or surface cutting. Ask for information on the RC-50, Bulletin RC 949, Cleco Division, 5125 Clinton Drive, Houston 20, Texas, or use the coupon.

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## Concrete Spreader with Oscillating Metering Screed

There are two models of this new Jaeger screw - screed concrete spreader: 10 to 15-ft. and 20 to 25-ft. width. Both models have 5-ft. adjustability in 6-inch stages. It is claimed that with these models, the need for a second finisher on high-speed paving is eliminated. Also, it is possible to spread and

strike off the base course, back up for the paver to pour the top course, and then finish the surface. There are many other advantages and devices which are best described in



Jaeger screw-screed spreader.

catalog CSS-O, which will be sent on request to Jaeger Machine Co., Columbus 16, Ohio, or by using the coupon.

Use coupon on page 93; circle No. 2-5

## Expanded Metal Guards Reduce Street Light Loss

New York City is using expanded metal as a guard for its street lights to prevent breakage of the bulbs. Some park lamps in the city had to



Wheeling lamp guard.

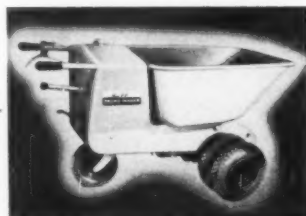
be replaced weekly—a tribute to the strong arms of New York boys. The expanded metal used for guards is similar to that used for concrete reinforcing. Full data from Wheeling Corrugating Co., Wheeling, W. Va., or by using the coupon.

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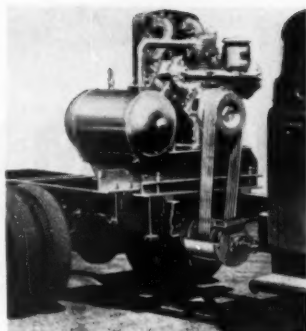
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New, exclusive "centerless" design of drills from ¼" through 7/16" diameters is 3 to 4 times more efficient than ordinary pointed drills. Concrete is penetrated faster with 80% less pressure. Prices on these drills have been reduced by as much as 50%.



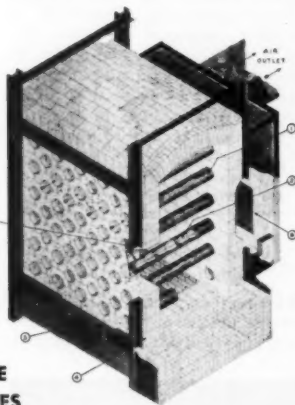
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Light-weight truckmixer.

other models correspondingly. This unit will mix and discharge zero slump concrete. Complete details from Blaw-Knox Co., Pittsburgh, Pa., or by using the coupon.

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#### Municipal Waste Disposal in the Home

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Use coupon on page 93; circle No. 2-11

#### The Flink "Even-Seal" Spreader

The design of this unit, which is a self-contained hopper-on-wheels unit for all seal and cover coat spreading, features uniform, fast spreading, either backward or forward, with forward speeds to 20 mph. Spill-over, either back or side, is impossible. Wet sand, as well as

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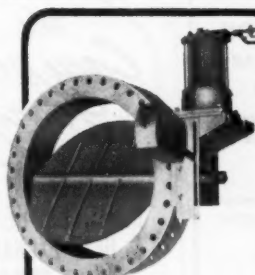
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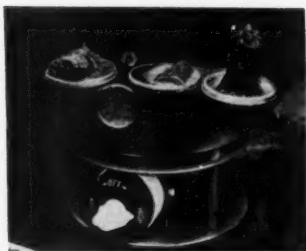
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packed in a protective and handy package. For information, write Tilden Tool Co., 1995 N. Fair Oaks, Pasadena, Calif., or use the coupon. Use coupon on page 93; circle No. 2-14



Caterpillar picture No. 75,000 shows a Wisconsin road job.

### 75,000 Pictures for Caterpillar

Field photograph No. 75,000 of Caterpillar Tractor Co. shows a road building job near Superior, Wisc. It was taken by a free-lance photographer, Frank Arver. Actually, this does not represent the total of Caterpillar's photographs because many were taken before numbering was started; nor does the number include many taken at the Peoria and San Leandro plants for publication purposes.

## PERSONAL NEWS

Robert A. Mitchell joined the staff of Gannett Fleming Corddry and Carpenter, Inc., Harrisburg, Pa., on Jan. 1, taking charge of the Traffic Division. Mr. Mitchell had been chief of the Bureau of Traffic Engineering, Philadelphia, since 1936. He is a Cornell graduate of 1921 and has been active in national traffic activities.

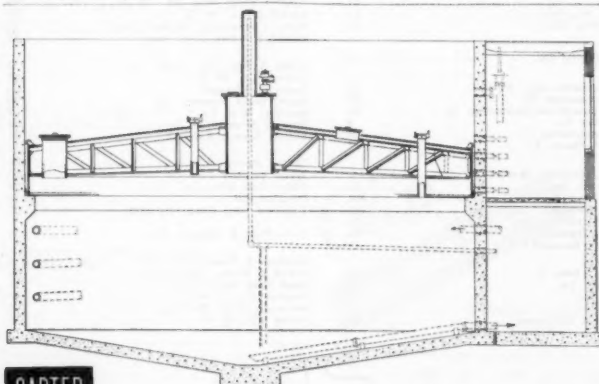
Oscar Corsoh, civil and sanitary engineer of Ambler, Pa., has been retained as consulting engineer by the Towanda Water Authority.

John Bumstead has been appointed assistant director of the Ohio River Valley Water Sanitation Commission. A former Lt. Colonel of the Sanitary Corps, Mr. Bumstead has been an associate editor of Engineering News-Record for the past several years.

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#### New Folder on Sheepfoot Rollers

59. A new catalog, Bulletin No. 892, on its line of Sheepfoot Tamping Rollers has been released by the Baker Mfg. Co., Springfield, Ill. The Baker rollers are made in single, double and triple drum models, all equipped with tamping feet shaped to compact soil without disturbing it on pullout. Get your copy by checking coupon.

#### Helpful Installation Manual For Drainage Structures

62. A 46-page manual, well worth careful study by designers and field engineers dealing with drainage structures, culverts, sewers or conduits, is offered by Arnco Drainage & Metal Products, Inc., Middletown, Ohio. Proper location of the structures, base preparation, assembly and backfill are some of the many items covered in detail. Use the handy coupon for free copy.

#### 20 Questions and Answers On Sanitary Landfill

75. The advantages of sanitary landfill, factors in site selection, kind and size of equipment needed, capacity of a given site and other important engineering considerations are discussed in Form 1084 prepared by the Trackson Co., Milwaukee 1, Wis. Check the coupon for complete information on this refuse disposal method.

#### Factors to Consider in Elevated Tank Selection

80. An interesting discussion of the factors to be considered for selection of elevated steel tanks for modern water storage, standard capacities and sizes, required fire flows and other useful data are included in a bulletin on elevated water storage published by Pittsburgh-Des Moines Steel Co., Neville Island P. O., Pittsburgh 25, Pa.

#### Protecting Engineering Records On Microfilm

85. "Facts and Figures on Microfilming Engineering Drawing" is a 16-page booklet prepared by the Micro-Photo Service Bureau, 4614 Prospect St., Cleveland 5, Ohio. Question-and-answer form text discusses the preservation of drawings and other valuable records on convenient microfilm for safekeeping and reduction of storage requirements. Be sure to investigate this service. Use the coupon today.

#### Do You Have Full Data on Wellpoint Systems?

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#### Latest Bulletins on the Hough "Payloador"

107. Carrying dirt and backfill, loading snow, grading and bulldozing are a few of the many jobs quickly handled by public works departments that use Hough, "Payloadors". Several models having bucket sizes from 12 cu. ft. to 1½ cu. yds. are offered. Check them all to see which is best suited for your job. The Frank G. Hough Co., 761 Sunnyside Ave., Libertyville, Ill.

#### Light-Weight Pipe for Many Uses

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#### Get Data on Expansion Joints for Pipelines

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#### Fast Jointing for Perforated Drain Pipe

145. The Bowerston "Tri-Line" spring clip, described in Bulletin No. 849, is designed to simplify jointing operations and reduce installation costs of perforated drainage lines, and to make the lines more stable under backfilling. Get full information on this new method of jointing and aligning plain end perforated pipes by using the handy coupon. Bowerston Shale Co., Bowerston, Ohio.

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179. In a 12-page booklet published by Proportioners, the many factors which enter into the design of a chemical feed system are discussed, and the types of systems used described in detail. These include dry feed, both volumetric and gravimetric and solution feed of the decauter and positive displacement pump types. Feeder controls are considered in detail. Send now for File No. RP-9080 by checking coupon. Proportioners, Inc., Providence 1, R. I.

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186. A 16-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes and valves by electronic means. Proper manipulation also determines depth of cover. Battery operated unit is readily carried by one man. Get data from Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif.

## Chlorination for Large and Small Pools

210. Dependable chlorination is a necessity for all swimming pools, no matter how large or small. You can find out just how to protect your pool in the most dependable and economical way by using the coupon or writing Wallace & Tiernan Co., Inc., Box 178, Newark 1, N. J.

## Does Your Water Works Have Standby Power?

224. Dependable Climax power plants are ready for emergency service to insure fire protection, and can also save power costs by peak load operation. Use the coupon for full data on Climax, 40 to 495 HP, operating on sewage or natural gas, butane or gasoline. Climax Engine & Pump Mfg. Co., Clinton, Iowa.

## Investigate This Compact Flow Meter for Water

224. The Foster "Flow Tube" is a new metering element that is compact and easy to install. Bulletin FT illustrates simple element containing nozzles for differential pressure production and shows capacity range and accuracy. Made in standard type sizes. Foster Engineering Co., Union, N. J. will send copy, or use coupon.

## Automatic Pump Control For Your Water System

229. In Bulletin 230-G4, Builders-Providence outlines the "Pressure Control" system which is said to save on first cost by providing ground level storage in residential areas; permit unattended operation of outlying stations; furnish instantaneous response to meet fire flow. Flow diagrams and typical applications are included. Mail coupon to check this versatile system. Builders-Providence, Inc., Providence 1, R. I.

## SNOW FIGHTING

### How to Select the Proper Sno-Plow for Your Truck

21. Fully illustrated 24-page catalog on Frink Sno-Plows includes valuable tables on proper plow and leveling wing selection for mounting on all size trucks. Detailed discussions cover special features which result in performance plus economy. Use coupon for copy. Frink Sno-Plows, Inc., Clayton, 1009 Islands, N. Y.

## Chemical Stops Salt Corrosion

174. A new chemical has been developed which, when mixed 1 pound to 100 pounds of salt, prevents any corrosion of automobiles by the salt. Harmless; colorless; odorless. Permits free use of salt for ice and snow control without complaint by drivers. Calgon, Inc., Pittsburgh, Pa.

## Two-Way FM Radio Telephone Equipment for All Departments

197. The benefits of two-way radio communication for all departments of municipalities and counties make full information on this subject important to all engineers. For descriptions of Motorola FM systems, or for specific recommendations concerning your application write to Dept. PW, Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.

## Full Line of Plows Meets All Snow Removal Needs

242. Data issued by the Gledhill Co. covers the 22 standard snow plows available to meet all snow removal needs. Safety trip, foldback hoist and interchangeability are featured. Write Gledhill Road Machinery Co., Galion, Ohio, or use coupon.

## STREETS AND HIGHWAYS

### Levels Sidewalks and Curb Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walls and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a new bulletin by Koehring Company, 3926 W. Concordia Ave., Milwaukee 10, Wis.

### Don't Overlook Aerial Surveys

30. Send now for your copy of "Aerial Surveys and Maps from Photographs" and learn the full story of how aerial surveys can assist you in planning highway developments and municipal improvements. Check the handy coupon. Abrams Aerial Survey Corp., Lansing, Mich.

### Municipalities Make Equipment Dollars Go Further

55. Be sure to get your copy of "Saving Facts" a new illustrated booklet prepared by The Oliver Corp. that shows how equipment dollars can be stretched on municipal work. Text and photos describe the application of tractors and money-saving attachments in street maintenance, snow removal, waste disposal, pipe laying and other projects. Write The Oliver Corp., Industrial Div., 19300 Euclid Ave., Cleveland 17, Ohio.

### Open Steel Mesh Pavement for Bridges

72. A pavement that is self-cleaning, self-draining, light of weight, strong, durable, fire-proof, economical and requires no maintenance, is described in a 24-page catalog by Irving Subway Grating Co., 5053 27th St., Long Island City 1, N. Y.

### How to Get Good Grass for Roadside Shoulders

192. For every step in lawn care and seasonal maintenance hints be sure to read "Lawn Care," an interesting periodical sent without obligation by O. M. Scott & Sons Co., 76 Spring St., Marysville, Ohio.

### Highway Spreaders For Every Use

84. Do you prefer a trailer type spreader, one driven with truck power take-off, or a complete motor-driven unit? All three types are offered by Highway Equipment Co., 630 D Ave., Cedar Rapids, Iowa, for spreading all ice control materials, sand or chips, crushed rock. New bulletins cover all models to help you select the one best suited to your needs. Use the coupon for your copies.

### Maintenance Means Many Tractor Jobs

139. Road maintenance means an unending list of jobs to be handled by tractors, either by tractor-mounted accessories or towed equipment. A new 8-page folder, "Make Maintenance Dollars Give More Mileage," tells how International crawler and wheel tractors are helping maintain city, county and state roads throughout the country. Get your copy by checking the coupon. International Harvester Co., 180 N. Michigan Ave., Chicago, Ill.

### Black-Top Paver Offers Many Advantages

150. The flexible Admura Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design

lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1954 State St., Nunda, N. Y.

### Versatile Maintainer Has Year 'Round Usefulness

181. A new bulletin shows how the sturdy Huber Maintainer will work for you the year 'round on maintenance jobs, berm leveling, road planing, bull-dozing, snow plowing, brooming, mowing shoulders and as a patch roller. Good ideas on how to do all these jobs in Bulletin No. M-138. Write Huber Manufacturing Co., Dept. PW, Marion, Ohio.

### Useful Data for Highway Builders in Barrett Road Book

190. The latest edition of "The Barrett Road Book" has 54 pages of helpful tables and step-by-step outlines of highway maintenance and construction with Tarvis and Tarvis-lithic. Tables show quantities per yard and mile; aggregate gradings; costs; many others. Get this useful book from Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

## SEWERAGE AND WASTE TREATMENT

### What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floor, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, 327 Fifth Ave., Pittsburgh 22, Pa. Check the coupon and we will forward your request.

### Design of Septic Tanks When Using Home Garbage Grinders

26. The use of a Youngstown Kitchens food waste disposer with a septic tank is thoroughly discussed in a new booklet released by Mullins Mfg. Corp. Tables show tank sizes for new construction, recommendations are made for improvements and better operation of existing systems, and a wealth of other valuable information is provided. For a free copy use coupon or write to Mullins Mfg. Corp., Dept. PW, Warren, Ohio.

### The Modern, Streamlined Elevated Tank

32. A new 8-page bulletin describes the Watersphere, a modern elevated water tank of welded steel construction for general service gravity water pressure and fire protection. Construction details, illustrations of typical installations and table of standard sizes from 25,000 to 250,000 gallons capacity are included. Check the coupon. Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

### How to Make Better Sewer Pipe Joints

37. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. P.W., Adams, Mass.

### A Handbook of Sewer Cleaning Equipment and Methods

46. A new, fully illustrated 40-page booklet shows every sewer cleaning operation with "Flexible" tools. Includes data on the fast and easily operated New Sewer Roder and full engineers' specifications for power bucket machines. For your copy write Flexible Sewer Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif.

### How You Can Dispose Of Sewage Solids

54. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Dept. PW, Nichols Engineering and Research Corp., 70 Pine St., New York 5, N. Y.

### Standard Forms for Concrete Pipes

67. Concrete pipe for sewerage, drainage and culvert projects can be produced quickly and uniformly with Quinn Standard concrete forms. Data on forms for 12" to 84" tongue and groove or bell end reinforced pipe from Quinn Wire and Iron Works, 1621 12th St., Boone, Iowa.

## FOR REPAIRING BELL AND SPIGOT JOINT LEAKS...

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Bell Joint Clamp for stepping bell and spigot joint leaks under pressure. Gasket is completely sealed at bell face by Monel Metal Seal band—at spigot by hand vulcanized gasket lip.

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640 COLUMBIA AVE., DARBY, PA.

### All Electric Floatless Liquid Level Control

76. Description of operating principles and applications of B/W controls shows the simplicity and many uses of these all-electric, floatless devices. Diagrams of typical installations and engineering data all in bulletin 147 issued by B/W Controller Corp., Dept. F.W., Birmingham, Mich.

### Engineering Facts About Transite Pipe

83. This compilation of Johns-Manville's "Engineering Facts" series presents concise, factual information about Transite's many economic and engineering advantages, and includes informative case histories plus dimensions and data for your files. Write Johns-Manville, Box 290, New York 16, N. Y., or use the handy coupon.

### How Cities Can Do Complete Sewer Cleaning From Street

98. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Power machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

### Get This Data for Your Laboratory

119. "Water and Sewage Analysis," a 32-page booklet, describes and illustrates a method for making convenient and accurate water and sewage analyses, including comparators, aqua testers and turbidimeters. Helligs, Inc., 3718 Northern Blvd., Long Island City 1, N. Y.

### Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive Blowers engineered to fit your needs. Air for activated sludge, water treatment; constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connorsville Blower Corp., 511 Poplar Ave., Connorsville, Ind.

### Your Laboratory Needs Reliable Equipment

123. Laboratory apparatus and chemicals; incubators, microscopes, pH meters, water stills, stirrers, turbidimeters, etc. can be obtained from any of the six branches of the Harshaw Scientific Div. of the Harshaw Chemical Co., Cleveland 6, Ohio. Use the coupon to get your catalog covering full line of water and sewage plant laboratory supplies.

### Data on New Single Stage Sludge Digestion Unit

143. High capacity mixing and ample gas storage space are provided in the new single stage digester type MA. Bulletin No. 6591 describes the unit and tells how it works. Photographs, drawings and useful tables of sizes and design data are included. Unit is available for tanks from 20 to 50 foot diameters. The Dorr Co., Barry Pl., Stamford, Conn.

### Data on Scum Removal For Primary Tanks

172. Send for Bulletin S 6000, published by Inflico Inc., for all the interesting facts concerning automatic hydraulic removal of scum from primary sewage sedimentation tanks by controlled currents. The same bulletin furnishes complete information on sedimentation and sludge removal. Write Inflico Inc., Box 5033, Tucson, Ariz., or use coupon.

### Air for Activated Sludge and Other Aeration Processes

187. Quiet operation, high efficiency and compact size are features of the Chicago "Standardaire" positive displacement blower. Wide range of capacities available to fit your needs. Details and performance data from Chicago Pump Co., 2348 Wolfram Ave., Chicago 18, Ill.

### Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 32-page Catalog

833. Detailed information is provided on bar screens, grinders, grit collectors, "Jigrit" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use coupon or write Jeffrey Mfg. Co., Columbus 16, Ohio.

### Data Offered On Mixed Flow Pumps

201. Data on the complete line of Worthington Mixflo pumps of the two-vane, non-clogging sewage type is offered in 16-page bulletin W-317-B16. Salient features are outlined, typical sections, performance curves and general data for five types are included. Helpful charts aid shafting selection. Copies available by using coupon or from Worthington Pump and Machinery Corp., Harrison, N. J.

### Data on Design of Grit Collectors and Washers

262. Grit collection and separation of organic materials from settled grit is described in Link-Belt Bulletin 1942. Typical installations are shown, and design data is provided, together with specifications. Use coupon for copy, or write Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

### How to Estimate Quantity Of Joint Compound Needed

229. Directions for using Atlas G-K Sewer Joint Compound plus a handy table quantity of compound and joint required per joint of sewer pipe are presented in Bulletin M20-1. Get full data on this permanent joint material from Atlas Mineral Products Co., 10 Pine St., Merittown, Pa., or use coupon.

### Vacuum Filters Feature Easy, Non-Clog Operation

241. Get full data on vacuum filters using double layers of continuous coil springs that insure continuous, non-clog operation for sewage sludge dewatering. Coils are automatically cleaned at each revolution. Komline-Sanderson Engineering Corp., Peapack, N. J.

## Newly Improved OK CHAMPION POWER SEWER CLEANER



## DON'T LOSE Sewer Capacity

Clear your sewer lines regularly. Keep up full carrying capacity and you save money—in lower maintenance cost and avoiding costly backwash. Order OK Champion Power Sewer Cleaner equipment and your men remove roots, dirt and other obstructions from any storm or sanitary sewer in ONE operation. All men work above street level.

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## REFUSE COLLECTION AND DISPOSAL

### How to Lower Costs Of Refuse Collection

35. For saving trucks, labor and time in city rubbish collection get details of the new Dumpster-Kolektor described in literature just published by Deuster Bros., Inc., 980 Dumpster Bldg., Knoxville 17, Tenn.

### Investigate This Plan For Garbage Elimination

164. A new presentation, written especially for municipal officials, offers a modern solution for the garbage disposal problem. Be sure you have this up-to-date information on the elimination of city garbage collection by the use of Hotspot Disposal units. Check the coupon now. Hotspot Disposal Department, 5600 West Taylor St., Chicago 44, Ill.

### Seven Advantages of Sanitary Land Fills

171. Development of sanitary fills to lower sanitation costs and steps for the proper operation of these fills are described in bulletin 12314 titled "Lowering Health and Sanitation Costs" and issued by Caterpillar Tractor Co., Peoria 8, Ill.

### An Incinerator Necessity

215. Recuperators featuring individual replacement of the heat transfer elements (allicon carbide tubes) for maximum accessibility and efficiency are described and illustrated in Bulletin 14 issued by Fitch Recuperator Co., Dept. PW, Plainfield Nat'l Bank Bldg., Plainfield, N. J.

## POWER AND LIGHT

### Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power for hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wisc.

### Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Supercharged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Pump & Machinery Corp., Dept. PW, Harrison, N. J.

### Modern Power Plants Want Diesel Economy

209. Be sure to check the Baldwin Series 600 Diesel Engine where diesel power is needed. Design features and specifications, performance curves, and ratings, which range from 430 to 1500 hp are covered in Bulletin 321. Check coupon for your copy and full details. Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

## CONSTRUCTION EQUIPMENT

### Data and Pictures of Complete Line of New Ford Trucks

58. Check this number on the coupon for colorful circular showing new Ford Trucks for every hauling need, available in great variety of standard, factory-built chassis and body combinations. Be sure to check these trucks on your job. Truck and Fleet Sales Dept., Ford Motor Co., Dearborn, Mich.

### Handy Catalog Covers Complete Tractor and Grader Line

70. A new 20-page booklet in a handy pocket size features Allis-Chalmers complete industrial tractor line. The importance of wise buying and fitting the equipment to the job is emphasized. Don't miss your copy. Use coupon today. Allis-Chalmers Mfg. Co., Tractor Div., Box 512, Milwaukee, Wisc.

### How to Keep Your Loader On the Job

50. Don't take more time to move your loader to the job than to do the work. Investigate the Eagle Truck Mounted Loader for handling gravel, sand, cinders, snow from windrows or piles. Get forms 444 and 947 from Eagle Crusher Co., Inc., Galion, Ohio.

### International Trucks Are Built to Take It

120. Trucks take a pounding in construction work—that's why you need data on International Trucks that are engineered for your job. Check the coupon or write International Trucks, Dept. PW, 180 N. Michigan Ave., Chicago 1, Ill.

### 52-Page Data-Packed Bulletin On Contractors' Pumps

95. Tables for pump size determination on every excavation job, pipe friction loss, attitude effects and lots of other valuable data are included in this comprehensive booklet illustrating

the many Jaeger "au-re-prime" pump applications. Get your copy (catalog P45) by checking our coupon or writing the Jaeger Machine Co., Dept. PW, Columbus 16, Ohio.

### Grading Can Be Faster, Cheaper and Easier

96. You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

### Helpful "How To Use" Section Aids Roller Selection

195. In addition to specification and illustrations of roller operation, the new Buffalo-Springfield catalog features a special section to help in the selection of the right roller model for the job. Be sure you get top results from your roller selection by checking this helpful material. Use the coupon for a copy. Buffalo-Springfield Roller Co., Springfield, Ohio.

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of a cement mortar lining, applied centrifugally by Centrline, is such that a lining of  $\frac{1}{4}$ " thickness will safely span holes up to and including  $\frac{1}{4}$ " diameter under water pressures as great as 200 pounds per square inch. Thus, past or future exterior penetration caused by corrosion or electrolysis will not affect the efficiency of Centrlined mains.

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## WORTH TELLING...



by Arthur K. Akers

● W. S. Carr, vice president of Abrams Aerial Survey Corporation, announces that in cooperation with Michael Baker, Jr., Inc., the Rochester, Pa., engineering firm, they are air-mapping Oak Ridge, Tenn., atomic energy plant. This follows a similar job at Richland, Wash., a part of the Hanford atomic energy project.

● We chronicle with regret the passing of an old friend, **Clement C. Covert**, long associated with W. & L. E. Gurley, Troy, N. Y., manufacturers of surveying and engineering instruments.

● If we seem to mention **Col. Bernard E. Gray** often it is because he is always moving-upward. This time it is into the presidency of **The Asphalt Institute**, New York.

● Not content with installing radio telephones in the cars of some of its service engineers, **Rodney Hunt Machine Company**, Orange, Mass., is also flying some of these men to points-of-need in the company's 4-passenger plane.

● W. E. Madden, vice president of the **George Haiss Manufacturing Company** division of **Pettibone Mulliken Corporation**, has been elected chairman of the portable conveyor group, Conveyor Equipment Manufacturers Association.

● **Robert J. Russell** has been appointed sales manager of **Harding Company**, York, Pa., makers of water and sewage treatment equipment. Since August 1948 he has been secretary and technical staff chief of the company.



Mr. Russell



Mr. De Graffenreid

● **Dean De Graffenreid**, pictured herewith, is now district sales engineer for the Tulsa, Okla., office of **Byron Jackson Company** (pumps).

● **J. J. Thompson** is coming from their Cincinnati office to become manager of the sales personnel and training division of **Worthington Pump and Machinery Corporation** at Harrison, N. J. **Wilbur R. Leopold** is the new assistant to Vice President **T. Cruthers** of Worthington, to function on public works projects.



Dr. Byrne

● Director of Research in Public Health and Sanitation is the title of **Dr. Maryland B. Byrne**, lately come to **Josam Manufacturing Company**, Cleveland, manufacturers of plumbing drainage products. Her services will be offered gratuitously by the firm as a consultant and speaker in the health and sanitation field.

● Early last fall, **Joseph H. Torchiana**, manager of **American Chemical Paint Company's** "Wee-done" sales, down in Ambler, Pa., sent us a sample for free. We took it out to our brush farm on Long Island and sprayed thickets of honeysuckle and poison ivy. Result: the deadliest set of weeds and brush we have ever seen. Better yet, they are still dead! Now if any good distiller cares for a personal test of his product...

● Begging his pardon, it is **John (not James) Stewart** of the W&SW Mfrs. Ass'n. And the picture did not do him justice. Our sincere apologies.

● One of our Irish friends hurried into a Second Avenue bar. "A pint before the row starts," he ordered.

He drank that up. "Another pint before the row starts."

He'd drunk that half way down when the bar tender asked, "What row?"

"I've no money," said the Irishman.

—Readers' Digest

**WHERE PIPE LINES  
ARE CONCERNED...**

*It's never  
a lucky break*

**BELOW**—Installing the 30" Lock Joint supply line for Ciudad Trujillo in the Dominican Republic. This line, undamaged by shocks which destroyed many structures in the vicinity, gave unimpaired service throughout the severe earthquake of 1946.



**RIGHT**—Damage attending the rupture of a large water main in a crowded community.



ONE SLIGHT FLAW IN A PIPE may develop the proportions of a major catastrophe when an important water line ruptures in a crowded area. Utilities can be impaired, property flooded, traffic stalled, business lost, life endangered. A bad break in more ways than one, but a break which could be avoided by using Lock Joint Pressure Pipe.

Lock Joint's water-tight expansion joints built into every section of pipe provide unrestrained flexibility under back loads to accommodate not

only normal ground settlement but traffic vibrations and variations in temperature. The high factor of safety assured by its time-tested design of reinforcement provides for every pipe an abundant reserve against water hammer and pressure surges. Experience shows conclusively that Lock Joint Pressure Pipe does not fail.

When planning your next water supply main—specify Lock Joint Concrete Pressure Pipe—the pipe with a proven record of safety.

**SCOPE OF SERVICES**—Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains in a wide range of diameters from 16" up as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.

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5. A larger chlorine residual leaving the plant than we formerly were wont to carry.

At the present time we have not realized any savings in the cost of chemicals. This is primarily due to the type of water we must treat. Since the raw water has a low alkalinity the additional use of chlorine must of necessity call for soda ash treatment and therefore additional cost.

Regardless of the cost we feel that the efforts expended to install and maintain the Break-Point process of chlorination has been unquestionably justified.

Yours very truly,

CINCINNATI WATER WORKS

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Sup'vr. of Water Purification

From: E. B. Evans

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To find out how your plant can obtain all these advantages call your nearest V&T representative today.

Exterior view, chlorinator house at the Cincinnati Filtration Plant.



Interior view showing five Wallace & Tiernan Master Chlorinators, Type MAHSV on the left, with their accompanying evaporators on the right.



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